

***ILLINOIS STATE WATER SURVEY***

**STRATEGIC PLAN**

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## BACKGROUND

Water always has been and will continue to be an essential natural resource in the development of Illinois and the nation. Ensuring the long-term availability of adequate supplies of clean water at a reasonable price is one of the greatest challenges facing Illinois and the nation. Clean drinking water is essential for human health, and large volumes of water are also needed for sanitation, agriculture, industry, power production, recreation, navigation, and countless other human activities. In addition, there is increasing recognition of the importance of maintaining surface waters that meet ecosystem needs.

Watersheds, aquifers, and ecosystems are recognized as units for resource management, complementing the more traditional political units, such as counties and municipalities. Still, water resource management in Illinois is conducted largely in a decentralized manner by a large number of private companies, municipalities, water authorities, and individuals.

Sound resource management practices must be based on many factors, including appropriate laws, regulations, and science. As concerns about water resources increase, new federal laws and regulations that impact Illinois are being formulated and implemented, and the possibility of new state water laws in Illinois is being discussed.

The Illinois State Water Survey ([www.sws.uiuc.edu](http://www.sws.uiuc.edu)) provides sound scientific and engineering data that are a necessary foundation for making wise decisions related to water resource issues and other issues such as climate change, severe weather, and air quality. The Water Survey also provides scientific and engineering data to researchers and the public.

This strategic plan provides a guide for resource planning within the Water Survey and is a source of information for those outside the Water Survey who have an interest in the organization's current and future activities. As a strategic plan, it focuses on future direction and the changes needed to achieve specified goals. It does not include explicitly the continuation of the many base programs. Therefore, the plan cannot be used as a comprehensive basis for budgeting and performance evaluation. The action items identified in the plan are included in staff job descriptions and provide a basis for performance evaluation.

The Water Survey has a long history of conducting objective scientific research and providing products and service to the citizens of Illinois and the nation. Over time, the mission has changed in response to evolving needs and opportunities. It is anticipated that this flexibility and responsiveness will continue to be a hallmark of the Water Survey.

The Water Survey is headquartered on the campus of the University of Illinois in Urbana-Champaign, and additional facilities are located in Champaign at Willard Airport, Peoria, and Carbondale. The current staff of about 220 employees includes professional scientists and engineers, technical and support staff, and university students and hourly employees.

The Water Survey has four sister agencies in the Illinois Department of Natural

Resources (IDNR): the Illinois Natural History Survey ([www.inhs.uiuc.edu](http://www.inhs.uiuc.edu)); the Illinois State Geological Survey ([www.isgs.uiuc.edu](http://www.isgs.uiuc.edu)); the Waste Management and Research Center ([www.wmrc.uiuc.edu](http://www.wmrc.uiuc.edu)); and the Illinois State Museum ([www.museum.state.il.us](http://www.museum.state.il.us)).

These institutions provide Illinois with a level of scientific expertise and capabilities that is unique in the nation.

The Water Survey was founded in 1895 as a unit of the University of Illinois ([www.uiuc.edu](http://www.uiuc.edu)) Department of Chemistry. Its original mission was to survey the waters of Illinois to trace the spread of waterborne disease, particularly typhoid. From these early times, the Water Survey also addressed the health and safety of public water supplies, water and wastewater treatment, and the establishment of sanitary standards for drinking water.

In 1917, the Scientific Surveys were transferred to the Illinois Department of Registration and Education, to be administered at the University of Illinois. At this time, the Board of Natural Resources and Conservation (the Board) was formed to guide Survey activities. The Board, composed of eminent scientists and professionals, continues to govern the Surveys today.

Scientific activities at the Water Survey have expanded greatly over time to include the development of an electronic dropline for measuring water levels, well and aquifer testing, and assessments of the state's surface and Groundwaters. In 1933, the Water Survey accepted primary responsibility for the operation of the U.S. Geological Survey's stream-gaging program in Illinois. Water Survey chemists cooperated with the University and the federal government during World War II in studies to detect chemical-warfare agents in water and develop methods for their removal. Meteorological efforts further expanded in the post-war years to include the use of radar to measure rainfall and to track severe storms. In 1953, Water Survey scientists were the first in the world to identify and photograph the radar image of the development, growth, and partial disintegration of a severe tornado. Today, radar is used worldwide to detect and track tornados.

In 1978, the Surveys were incorporated in the new Illinois Institute of Natural Resources, which became the Department of Energy and Natural Resources in 1981. The Hazardous Waste Research and Information Center was originally organized as part of the Water Survey in 1984, but three years later it was authorized as a separate entity. In 1995, the Surveys became divisions in the Office of Scientific Research and Analysis in the IDNR ([dnr.state.il.us](http://dnr.state.il.us)).

The Water Survey is supported by a combination of an annual appropriation from the General Assembly and by grants and contracts, which are funded by a wide range of sponsors in Illinois and the nation. The grants and contracts are awarded to and managed through the Board of Trustees of the University of Illinois. The Water Survey is also an Affiliated Member of the University of Illinois at Urbana-Champaign.

## Mission

The mission of the Water Survey is based on a number of legal mandates and evolving priorities and is as follows:

**The Illinois State Water Survey is the primary agency in Illinois for research and information on surface water, groundwater, and the atmosphere. Its mission is to characterize and evaluate the quality, quantity, and use of these resources. The mission is achieved through basic and applied research; by collecting, analyzing, archiving, and disseminating objective scientific and engineering data and information; and through service and outreach programs. This information provides a sound technical basis for the citizens and policymakers of Illinois and the nation to make wise social, economic, and environmental decisions.**

## Considerations in Developing the Strategic Plan

This strategic plan for the Water Survey has been developed in the context of current conditions and emerging trends. The following findings were important considerations in developing the strategic plan:

- Data collected and scientific expertise within the Water Survey will continue to be needed to contribute to a high quality of life, economic development, and the protection and restoration of natural resources in Illinois.
- In general, there is an inadequate understanding of the environmental implications of a variety of economic and societal decisions and activities.
- Populations are shifting and expanding rapidly in some parts of the state. This puts increased demands on water resources and ecosystems and on the science-based management of these resources.
- There is increasing concern about non-point source pollution, especially from nutrients, agrochemicals, and sediments. The accumulation and fate of nutrients, agrochemicals, and their associated products in soils and aquifers needs to be addressed. Data collection and scientific analysis will enhance evaluation of the needs for and the development of possible further voluntary and regulatory controls of pollutants.
- With a planned new federal standard to limit the concentration of arsenic in drinking water, the demand for reliable scientific data on arsenic sources, arsenic concentration, and arsenic removal is increasing.
- Watersheds provide well-defined geographic units for studying surface waters and wetlands, connections between surface water and Groundwater, and water quality. It is

recognized that each watershed is unique and the management or restoration of any watershed should reflect all of the components that interact in the watershed to influence water quantity, quality, and use. Watershed issues will increase in complexity.

- The state and several federal agencies have made major commitments toward the restoration of the Illinois River Watersheds, as demonstrated by the development of the Integrated Management Plan for the Illinois River Watershed, the creation of the Illinois River Coordinating Council, and the success of the State in obtaining funding for the Illinois River Conservation Reserve Enhancement Program (CREP), and the Illinois Rivers 2020 initiative.
- There has been substantial grassroots interest in watershed restoration that includes stream, streambank, and lakeshore stabilization; wetland creation and restoration; and the implementation of different Best Management Practices (BMPs) such as buffer strips and conservation tillage.
- Illinois continues to play a leading role in regional water-resource issues, including issues related to management of the Upper Mississippi River, Lake Michigan, non-point source chemicals, sediment, and nutrients.
- There is an increasing need to interpret and communicate the results of complex scientific research in non-technical terms for use by resource managers, policymakers, and the public.
- Illinois is increasingly influenced by environmental, economic, and energy issues outside of the state (e.g., hypoxia in the Gulf of Mexico; global climate change; and energy restructuring), as well as within Illinois. Addressing these issues will necessitate the development of regional, national, and global analytical capabilities to evaluate potential implications for Illinois. Increasingly complex state, regional, and national environmental, social, and economic issues require greater challenges to define the issues, to communicate them to legislators and the public, and to identify possible solutions.
- Climate variability and air quality have great impacts on the environment, society, and economy in Illinois. Human activities in Illinois and the rest of the world also affect climate and air quality. Hence, there is a need to improve our understanding and prediction of the atmospheric system.
- The interconnectedness and complexity of issues means that computer models are needed to address them.
- More human and financial resources will be needed to address the issues. The Water Survey cannot continue to provide the current suite of public services, expand these services and address new issues with the existing financial resources.

- Public demand for short-term benefits, quicker responsiveness, and less expensive and more efficient government programs are likely to continue at the expense of longer-term research and planning efforts.
- The Water Survey is operating in an environment of increasing focus on quality management.
- The state has potentially competing interests in promoting economic development, while also supporting environmental stewardship, restoration, and protection. The Water Survey conducts research and provides services that can help harmonize these demands in the best interests of the citizens of Illinois.
- New technologies are rapidly changing our ability to communicate with large audiences and to archive, transmit, receive, and analyze large amounts of data. The Water Survey is challenged to stay abreast of these developments and utilize them.
- State government is strengthening its efforts in strategic planning, performance evaluation, and performance-based budgeting in order to demonstrate the efficient and effective use of public resources.

### **Vision to 2006**

The following vision statement depicts the desired evolution of the Water Survey:

The Illinois State Water Survey will continue to strive for excellence in providing data, research, and services that the citizens of Illinois and the nation have come to expect and rely upon for over a century. In addition, the Water Survey will continue to address emerging water and atmospheric issues that are of economic, social, or environmental importance to the state. Expertise and capabilities at the Water Survey will be publicized inside and outside of Illinois, so that public and private entities will look to the Water Survey as a prime source of scientific information on water and atmospheric resources important to Illinois.

The Water Survey will continue to seek additional resources in support of its mission, with an emphasis on interdisciplinary team approaches and collective strengths. Collaborative partnerships will be strengthened throughout the Water Survey, among the Scientific Surveys, with other offices of the Illinois Department of Natural Resources, the University of Illinois, other academic institutions, government agencies, not-for-profit organizations, and the private sector. Advice from external experts will be considered in setting the focus and direction of Water Survey programs.

The Water Survey will become more active in the development and use of numerical computer models to understand and explain fundamental processes and the functioning and structure of complex systems, and to make projections about the future. Based on the outcome of these models and other scientific considerations, the Water Survey will also take a lead in planning and



conducting natural-resource assessments that synthesize technical information to help answer policy and resource management questions. Fundamental to the mission of the Water Survey, the long-term data collection effort will be strengthened, with emphasis on the quality and reliability of data.

Policies and procedures will be established to make the Water Survey more efficient, responsive, competitive, and accountable. Emphasis will be placed on the use of new technologies to maximize efficiency and to collect, analyze, manage, and disseminate data more effectively. Outreach and education services will be expanded, including services to urban centers, to ensure that constituent interests are identified and Water Survey information and products are readily available.

Existing facilities will be well maintained and new facilities on the campus of the University of Illinois in Champaign/Urbana, and in northeastern Illinois, will be occupied.

The Water Survey will seek to hire and retain highly motivated people who possess appropriate skills in science, engineering, administration, and management.

## **OFFICE OF THE CHIEF**

### **Mission**

The Office of the Chief provides the scientific leadership and management of the Water Survey. The administrative functions within this office provide Survey-wide support of the research/service activities in the areas of human resources, financial management, computer and network operations, internet services, publications services, library service, education and outreach, data management, quality management, geographic information systems, information technology, and facilities.

### **Goals**

- Maintain high-quality program of research, data collection, analysis, and dissemination, and public service.
- Maintain a strategic plan for the management of programs and resources, leading to the identification of performance indicators and activity measures.
- Expand scientific capabilities to address existing and emerging water-resource issues
- Provide effective and efficient administrative support to staff.
- Provide state-of-the-art facilities.
- Provide state-of-the-art equipment and technology.

## Strategies

The Office of the Chief will lead Survey-wide collaborative efforts to implement the following strategies.

- Collaboration among the Scientific Surveys ([www.sws.uiuc.edu/docs/JSPlan/](http://www.sws.uiuc.edu/docs/JSPlan/)). The Water Survey will function as a member of a shared pool of multi-disciplinary research and technical expertise provided by the Scientific Surveys and the State Museum. The diverse capabilities will focus on scientific and social issues of interest to Illinois. These institutions will act collectively to continue to be recognized as the prime source of objective scientific analyses in Illinois on natural resource-related issues affecting Illinois, the Midwest, and the nation. They will also expand their capabilities to address emerging natural resource-related issues in specific watersheds.
- Dovetailing with Other IDNR Offices. Science is an important basis for the management of natural resources, which is the prime function of IDNR. The Water Survey will continue to be an active player in the development and implementation of the “Vision and Action Plan for IDNR,” especially in enhancing the capabilities of the Department to provide Illinois with scientific expertise, data, and information to meet societal needs in the 21st century. In particular, the Water Survey will help build scientific capabilities to manage watersheds, ecosystems, and state land.
- Partnerships. The history of the Scientific Surveys is intertwined with that of the University of Illinois, and there are ongoing discussions of new facilities on campus and enhanced program planning between the Scientific Surveys and the University. The Water Survey will participate actively to foster and strengthen this partnership in areas of research, data collection and access, public service, and new facilities. Partnerships with scientists at other universities and government laboratories also will be pursued to enhance the Water Survey’s scientific activities and capabilities.
- Relations with State and Federal Agencies. Some relationships between the Water Survey and state agencies are legally mandated. These relationships will be fostered, and relationships between the Water Survey and other state and federal agencies will be enhanced as appropriate.
- Constituent Relations. The mission of the Water Survey is to serve the citizens of Illinois. In order to better serve the priority needs of multiple constituents, the Water Survey will enhance its education and outreach programs to identify information needs, to distribute information, and to provide leadership and advice to constituents in the use of this information.
- Effective Use of Resources. In order to ensure that scarce resources are used to meet priority needs in an effective manner, the Water Survey will evaluate the current use

of state resources and ensure that these resources are applied in ways that best meet the state demands for information. Strategies for maximizing the use of grant and contract funds will be evaluated. Overall, an administrative structure will be continued that maximizes efficiency and keeps overhead costs to a minimum, while providing the highest level of service.

- **Facilities.** Survey facilities will be maintained in order to address health and safety issues. Capital Development funding will be pursued to provide for major renovations and/or new facilities.
- **Financial Support.** The Water Survey will seek to increase state appropriations to cover core operations and to secure additional support through grants, contracts, and nontraditional sources of financing. Competitive salaries and benefits will be sought and maintained.
- **Hydrologic and Biogeochemical Cycles.** The hydrologic and biogeochemical cycles will provide a systems framework for Water Survey projects. The major components of these cycle - atmosphere, surface water, and Groundwater - will provide the basis for organization and program management at the Water Survey. Just as all the major components of the hydrologic and biogeochemical cycles are interconnected, so too shall many of the major programs at the Water Survey be linked in a systems approach.
- **Watersheds.** The Water Survey will use watersheds and basins as focal units of scientific investigation, data collection, and public service on the water resources of the State of Illinois.
- **Groundwater.** Groundwater aquifers are not coincident with watersheds or basins. The Water Survey will study the hydrology, hydraulics, and water quality of local and regional aquifers and their connections to surface waters.
- **Analytical, Prediction and Presentation Tools.** Consistent with a systems approach, greater emphasis will be placed on the development, calibration, testing, and application of mathematical, computer-based models as tools to better understand systems and to predict the state of the environment in the future.
- **Data Collection and Analysis.** To understand environmental processes, to document the variations of important variables over space and time, to evaluate the impacts of human activities on the environment, and to provide data for model development and testing, the Water Survey will review and, as necessary and according to resource availability, regenerate its data collection and analysis capabilities.
- **Data and Information Management.** To ensure high-quality, distribution, access, and archiving of data and information, the Water Survey will implement a data and information management plan. Modern mathematical, computer-based tools will be

used to handle, present, and distribute data and information. New databases will be created, when needed, and existing databases will be maintained and improved and made Web- and GIS-compatible. Access to stored data through user-friendly interfaces will be improved. A systematic approach to the archival of data will be made. Summaries and publications of the data contained within the Water Survey's historical records will be produced.

- **Quality Management.** The Water Survey will implement a quality management plan (QMP) that will cover all environmental data collection programs. The QMP will serve as a guidance document for all principal investigators to ensure that data collection programs include adequate management controls and resources for their intended use.
- **Electronic Communication.** The efficiency, timeliness, and value of the data collection and services programs will be improved by enhancing the quality and quantity of information available on the Internet. State-of-the-art hardware and software will be acquired and maintained.
- **Scientific Outreach and Communication.** Scientific staff will continue to communicate their findings to the scientific community through peer-reviewed journal articles and presentations at professional meetings. These activities will ensure that the scientific output is of high quality and a significant contribution to science.
- **Mentoring.** Active mentoring of new staff by senior staff will promote professional development and participation in Survey programs.
- **Recruiting and Training.** To ensure the continued provision of quality research and services; to improve efficiency, productivity, and accountability; and to promote professional development, professional training and staff development will continue to be offered to all salaried staff at the Water Survey. Internal staff expertise on issues of importance to Illinois will be maintained through literature review and attendance at relevant professional meetings. Competitive compensation will be emphasized in order to attract and retain staff with high levels of scientific and engineering expertise, and administrative and management skills. As programs grow and additional expertise is needed, new staff will be hired.
- **Computer/Network Security.** Additional security options, such as personal firewalls, will be explored to provide a more secure work environment.

## **Action Items: April 2001-March 2002**

### **Education/Outreach**

- Hold workshops, seminars, and conferences on current and emerging issues that impact Illinois citizens (e.g., water supplies, energy and environment). In particular, plan and convene the Governor's Conference on Energy and the Illinois Environment in November 2001.
- Continue to scan and digitize historical reports and make these available on the internet.
- Participate in a UIUC/Surveys series of workshops to identify cooperative research initiatives.

### **Facilities**

- Complete the design for, bid, and start construction of ~14,000 square feet of new shop/laboratory/storage/office space at the Water Survey Research Center. Future of project dependent on a final University of Illinois south campus planning. Construction phase of the project placed on hold until 6/30/01 as per DNR's request.
- Complete the design for, bid, and start construction of the new power-plant boiler and chiller systems at the Water Survey Research Center. Future of the project dependent on a final University of Illinois south campus planning. Construction phase of the project placed on hold until 6/30/01 as per DNR's request.
- Complete the planned installation (dependent on availability of funding) of electronic exterior locks to increase safety and security of staff and facilities.
- Continue planning to staff additional office space in the new IDNR Tri-County building (Region #2) located near Bartlett, IL. Budget additional FY02 costs for staff, vehicles, and associated costs.
- Continue Water Survey involvement in the South Campus Planning process regarding the planning of future Water Survey Research Center facilities.
- Continue to monitor and support the need for traffic signal controls at Gerty/First Street; Hazelwood/First Street; and St. Mary's/First Street.
- Develop monitoring and replacement schedule of office furniture.

### **Data & Information Management**

- Create an inventory of electronic scientific data sets.

- Develop a project planning/evaluation form to describe project data management requirements.
- Continue to enhance database design, security, and backup services for the ISWS.
- Develop a Web bibliography (electronically searchable) of publications authored by Water Survey scientists.
- Continue working with the ISGS and computer staff to upgrade existing database software to a Web-based version, and to enhance and maintain the Library Catalog databases to provide public access to them.
- Install physical security devices to safeguard various network equipment sites located at the Water Survey Research Center.
- Purchase and implement Personal Firewalls Survey-wide for Windows machines.
- Implement the Water Survey Personnel Information Database System (PIDS).
- Plan for electronic signatures in areas such as purchase requests and leave sheets.
- Continue developing the ISWS Home Page on the Internet and increase accessibility to data.
- Continue efforts to catalog existing GIS layers.
- Implement an Internet Map Server to allow World-Wide-Web accessibility to existing GIS layers especially those within the Illinois River watershed.
- Create and implement a GIS Quality Management plan.
- Review and revise the ISWS Quality Management Plan to ensure that it meets the needs and requirements of internal staff and external funding agencies.
- Implement through the University of Illinois, ADAMS, Departmental Accounting Management System currently under development for large research departments.
- Finish development and implementation of automated coordinated personnel database.
- Monitor and develop replacement schedule for computers.
- Complete annual, internal review of PSL and Analytical Services group.
- Complete bi-annual, external review of PSL and Analytical Services group.

## **Research**

- Lead the Survey in the development of nitrogen mass-balance studies for watersheds in Illinois.
- Conduct a Literature review of carbon sequestration in Illinois soils.
- Submit an article on terrestrial N cycling for publication in the peer-reviewed literature.

## **Professional Development**

- Provide state-of-the-art training for staff on computers, software, and related technological advances.

# **Atmospheric Environment Section**

## **Mission**

The mission of the Atmospheric Environment Section is to advance the use of atmospheric information for applications of benefit to the environment, the economy, and society of Illinois, the Midwest, and the nation through the performance of basic and applied research, the collection and analysis of relevant data, and the provision of scientifically sound and credible information to the citizens and policy makers.

## **Vision to 2006**

The scientific program will be highly relevant to state needs, prominent on a national scale, and known internationally. The program will enhance the state's ability to understand complex air quality, weather and climate issues, to assess water-resources issues related to the atmosphere, and to evaluate resource-management and policy options. Modeling on many scales will play an increasingly important role in focusing and integrating the research of the Section. Key decisions in Illinois relating to the development and management of natural resources and environmental protection will increasingly be made on the basis of scientific information provided by the AES.

## **Goals**

- To achieve a better understanding and greater predictability of climate and air quality variability and change in Illinois and the Midwest through data analysis and regional models that have been improved on the basis of various research activities, including cloud-radiation interactions, cloud physics and dynamics, land-atmosphere interactions, and aerosol physics and chemistry.

- To expand the extensive services program through the State Climatologist program and the Midwestern Climate Center.
- To advance our understanding of severe and hazardous weather processes and events and their impacts in Illinois, including intense lake-effect snow storms, lightning hazards, freezing rain, fog, and severe summer and winter storms.
- To improve air quality and climate predictions based on regional and global climate models through research on cloud physics and dynamics and on aerosol physics and chemistry.
- To enhance our understanding of air pollution so as to provide policy-relevant information for Illinois and the Midwest through the continuation and expansion of our current program in air and precipitation-quality measurements and their interpretation.
- To improve our understanding of and capability to predict the impacts of weather, climate, and air pollutants on society (including health, economics, and quality of life), agriculture, and on water resources and other environmental conditions.

### **Strategies**

- The modeling capabilities of the section will be developed through the continued implementation of the CAQIMS program. The modeling of cloud and weather systems will be continued and enhanced. Internal computer facilities and external sources of computer resources will be expanded in order to provide the capabilities to perform key aspects of the modeling. RCM integrations will be conducted to generate a comprehensive and realistic database and, through detailed diagnoses, to evaluate the RCM capability to reproduce observations and to better understand the physical processes and underlying mechanisms that cause interannual climate (especially precipitation and surface air temperature) variations in Illinois and the Midwest.
- The laboratory and field experimental capabilities and data collection activities of the section will be expanded. This may include the use of Geographic Information Systems (GIS) and other state-of-the-art visualization tools, expanded access to data from satellites, aircraft, radar, wind profilers and lidars. Energy flux measurement capability will be enhanced to include carbon fluxes. Emphasis will continue to be placed on the traditional areas of cloud and aerosol microphysics and on laboratory chemical analysis and techniques.
- Proposals to seek funds will be developed in response to selected opportunities in order to expand programs in mesoscale meteorology, boundary layer meteorology, aerobiology, air quality, geochemical cycles, aerosol physics and chemistry, regional climate and impacts modeling, agricultural climatology, hydrometeorology/climatology,



climate change studies, and the effects on society of such problems as animal odor, airborne pests, and climate extremes.

- External support for the activities of the section will be enhanced by increasing our interactions with key Illinois user groups including state and local government agencies, business groups, private sector, and other organizations. Federal agency support will be increased by working closely with NOAA to establish a clear vision for the role of the RCCs.
- Partnerships with scientists at other organizations such as the University of Illinois, National Center for Atmospheric Research (NCAR), government laboratories, other universities, and the National Weather Service, etc., will be pursued to enhance the section's scientific activities and capabilities.
- Scientific staff will enhance their communication of their findings to the scientific community through peer-reviewed journal articles and presentations at professional meetings. This activity will ensure that the research output of the section is scientifically defensible and a significant contribution to science.
- Scientific staff will translate their findings for communication to the non-scientific community through more press releases, popular articles, and items for the ISWS web page.
- The efficiency and value of the data collection and services program of the Office of State Climatologist and the Midwest Regional Climate Center will be improved by enhancing the quality and quantity of information available on the Web.
- Participation in national field programs and research initiatives will be pursued in order to leverage the Section's expertise and equipment, allowing a more comprehensive investigation of issues that relate to Illinois.
- Assessments of major climate anomalies that impact Illinois and the Midwest will be performed when they occur.
- Internal staff expertise on atmospheric environment issues of importance to Illinois will be enhanced through literature review and attendance at relevant scientific meetings.
- More active mentoring of younger staff by senior scientists will promote their more rapid advancement and participation in their scientific fields and the Section's programs.
- Staff will participate in the education of graduate and undergraduate students to encourage growth of knowledge in scientific areas relevant to the state.

- Scientific staff will be more involved in the review of scientific papers and proposals which reflects our staff's scientific importance, responsiveness to national needs, and the potential for learning new insights.

### **Action Items: April 2001 - March 2002**

- Conduct RCM integrations for the period 1979-2000 through collaboration with NOAA Air Resources Laboratory (ARL) and UIUC Department of Atmospheric Sciences (DAS).
- Study the linkage between Midwestern and North American Monsoon precipitation variability through collaboration with UIUC/DAS and NOAA/ARL.
- Start to apply and improve the Weather Research and Forecasting (WRF) model being developed by multiple universities and government agencies and laboratories. This effort is essential to make a prompt transition of the RCM dynamical core from the current MM5 toward its next generation: WRF. The effort is being initiated through collaboration with NCAR, NOAA, and NCSA.
- Estimate mercury emissions in the US and add mercury chemistry to the Air Quality Model. A simulation period will be selected through the analysis of the observation data of mercury deposition at NADP. The result of the simulation will be used to compare with the observational data collected by NADP.
- Identify general and specific QA/QC practices that are appropriate for typical research projects conducted by the atmospheric chemistry group. Draft a QA/QC guidance document that describes how those practices may be implemented most effectively.
- Develop partnerships with the University of Illinois College of ACES and state, federal, and private agencies to obtain support to understand the potential for carbon sequestration in agricultural fields by studying the carbon cycle and soil organic carbon under different tillage practices.
- Improve the concentrations and flux estimates for dry and wet deposition of oxidized and reduced nitrogen to Illinois and surrounding states.
- Work with IEPA to characterize annual, seasonal, and day-to-day variations in the composition of regional PM-2.5 at the Bondville field site.
- Proceed with rebuilding the MRCC web site to improve access to climate information by both the general public and MICIS subscribers.

- Extend relationships with National Weather Service offices through joint visits, interactions, and studies.
- Serve on prestigious national, regional, and state advisory panels and committees to provide guidance and reflect Illinois' interests.
- Enhance the mesoscale/boundary layer meteorology group. This will include supporting graduate students to examine mesoscale processes relevant to the Great Lakes region and continuing to seek external funding sources to support these efforts.
- Provide climatological data and expertise for the development of the Illinois River Decision Support System.
- Initiate, if a proposal is funded, a modeling and data analysis program to study the influence of large condensation nuclei on precipitation amounts from warm cumulus clouds. A new field project may be necessary to completely resolve this issue. We will determine if a field program is justified and, if so, develop a scientific plan for the project and begin seeking federal support.
- Seek external funding to support investigation of airborne insects and their movement in the Midwest.
- Participate in the development of a multi-agency project to investigate the inter-annual propagation of West Nile Virus in the eastern and central U.S.
- Accelerate development of a comprehensive Illinois Climate Atlas.
- Investigate severe fog events in Illinois and the Midwest.
- Work with the National Climatic Data Center and the Office of Global Programs to develop a national thunder and hail atlas.
- Achieve more coordinated and substantial interactions between MRCC, NCDC, and the other RCC's through participation in the Data Base Modernization Project and the Unified Climate Access Network Project.
- Develop a web site that provides real time soil temperature data for use by farmers in making fertilizer application and time of planting decisions. The web site will also include all other weather variables monitored at the Illinois Climate Network stations.
- Identify potential alternative crops for Illinois and identify the suitability of growing each crop based on temperature, precipitation, length of growing season, soil pH, bulk density, and drainage. The identified alternative crops will be presented in printed and web site media.

- Deliver the recomputed R-Factor for the United States, and study the temporal and regional variability of the R-Factor and rain storm characteristics.
- Complete research on methods to estimate winter and summer design temperatures from daily cooperative temperature data.
- Work with NOAA NCDC on the establishment of a new climate monitoring station, part of the newly-established Climate Reference Network, at Bondville.
- Implement procedures to improve network security, data and information management, and quality management.
- Prepare material for presentation at the Governor's Energy Conference.
- Contribute to the ISWS plans for water resources assessments statewide.

## **ANALYTICAL CHEMISTRY AND TECHNOLOGY UNIT**

### **Mission**

The Analytical Chemistry and Technology Unit (ACTU) provides analytical chemistry and technological services and consultation to state institutions, communities, and private citizens in Illinois and the Midwest, including Water Survey scientists. The Institutional Water Treatment Program (IWTP) provides advice to state facilities on the purchasing, specification, and implementation of chemical treatment for all of their water-using systems. The Public Service Laboratory (PSL) provides analytical testing and consultation to a wide range of users throughout Illinois. The Analytical Services group provides chemical analyses in support of the research activities of Water Survey staff and external researchers. The Midwest Technology Assistance Center (MTAC) provides technological support for small public water supplies and Native American Indian water supplies throughout the Midwest.

### **Vision to 2006**

The ACTU will continue to provide the highest quality technical and analytical services possible for private citizens of Illinois, state institutions, private and public utilities, internal researchers, and outside sponsors. The IWTP will continue to maintain strong bonds with other state agencies and facilities, expand their involvement in the program, and strive for continued national recognition in the field of corrosion control and water treatment. The Analytical Services group will implement and continue to update its Quality Assurance Plan on an ongoing basis. The PSL will expand its outreach efforts by increasing public awareness of program

services and capabilities. The MTAC will become a well- recognized resource for technical assistance providers, small system administrators, and regulatory officials to help small public water systems meet their needs for technical, managerial, and financial capacity development.

### **Goals**

- Maintain and expand the level of participation by state agencies in the Institutional Water Treatment Program.
- Maintain an active research program with outside sponsors relating to corrosion control and water treatment.
- Maintain and strengthen existing quality-management practices and documentation to ensure the highest quality data and information is produced.
- Maximize the benefits that the ACTU provides to Illinois citizens and the Water Survey. Increase the efficiency, productivity, and accountability of the Analytical Services and Public Service laboratory groups.
- Maintain a viable, productive Analytical Services Laboratory (ASL) to support the analytical needs of other Water Survey scientists in a cost-effective manner.
- Establish the reputation of the Midwest Technology Assistance Center as a valuable resource for small public-water systems.

### **Strategies**

- Purchase analytical instruments with a combination of state and contractual money (as appropriate) that are needed to maintain, expand, and automate the analytical and data archival capabilities of the Analytical Services and PSL groups. Implement a depreciation account for all instruments purchased with contractual money, to allow replacement of the instruments on a regular basis without incurring undo expense to the service account.
- Conduct annual internal and external reviews of the PSL (under the supervision of the SWS Quality Assurance Officer) to assure compliance with good laboratory operating procedures and the laboratory Quality Assurance Plan.
- Fund competitive grants at universities (utilizing a peer-review process) within the Midwest region through MTAC to address critical issues for small public water supplies.
- Develop MTAC training and education programs and/or tools (such as interactive CD's) in partnership with other groups such as the Illinois Section American

Water Works Association (ISAWWA), the Illinois Rural Water Association (IRWA), and the Environmental Resources Training Center at SIU-E to use their expertise and established relationships with the small utilities.

- Maximize the Unit's benefit to Illinois citizens and the Water Survey by increasing public awareness among private citizens, government officials, and the news media.
- Develop an enhanced Web presence that benefits all Unit programs in the ACTU.
- Continue to provide expert consultation to state facilities on water treatment and corrosion control, maintain current enrollment in the program, and expand participation from new or existing institutions in the IWTP.
- Maintain the highest standards in productivity and quality for laboratory activities while supporting the analytical needs of internal research staff, basing charges for analysis upon full-cost recovery of expenditures for supplies, staff, quality assurance requirements, data archival, and instrument maintenance costs. Encourage Principal Investigators in other Survey sections requiring analytical services to discuss their needs when preparing proposals. Encourage PI's to utilize available QA/QC data for reported measurements.
- Submit proposals for funding to address issues related to corrosion control and water treatment in potable and other water-using systems.
- Encourage staff to remain active in professional societies in a manner beneficial to their continued professional development and related to their job duties; encourage staff participation in conferences, technical symposia, technical committee meetings, and workshops as permitted by time and resources; and encourage senior staff to present peer-reviewed papers, perform technical committee work, or present oral presentations at these meetings.
- Facilitate improvement and growth in job expertise and professionalism of junior staff through mentoring by senior staff, particularly of those individuals who senior staff envision may have increased responsibilities in the future (staff supervision or PI status). Encourage all staff to continue their professional growth by taking advantage of the available staff development courses sponsored by the University of Illinois, the State Water Survey, IDNR, or other sources as appropriate.

## **Action Items: April 2001 - March 2002**

- Contact Community Colleges around the state to encourage their participation in the IWT program. Encourage attendance at the Annual Illinois Institutional Chief Engineers Conference to familiarize them with the IWTP program.
- Comply fully with laboratory Quality Assurance Plan, including standards for sample tracking, quality assurance, and general laboratory practices.
- Develop job description and requirements for a Laboratory Quality Assurance Officer, and seek to hire a qualified individual to assume that position.
- Complete annual, internal review of PSL and Analytical Services group.
- Complete annual, external review of PSL and Analytical Services group.
- Develop a ASL web site with information and resources to assist PI's in developing proposals.
- Plan a joint Small Systems Conference for late 2002 with the other seven Technology Assistance Centers for Small Public Water Systems. Assume a leadership role in planning and organizing the conference.
- Disseminate MTAC products and information regionally and nationally through a partnership with the National Drinking Water Clearinghouse.
- Update the MTAC web site design to make it more user friendly and graphically appealing.
- Select proposals for funding from MTAC through a peer-review process, and oversee the progress and compliance of the PI's.
- Oversee development and progress of all directly funded MTAC cooperative projects.
- Submit quarterly progress reports to USEPA for MTAC.
- Implement routine use of LIMS for laboratory.
- Explore the possibility of adding arsenic to the suite of analysis performed by PSL.
- Develop, in cooperation with the Scientific Sections, of a water-quality plan for the Water Survey.

# **WATERSHED SCIENCE SECTION**

## **Mission**

The mission of the Watershed Science Section is to characterize and evaluate the quantity, quality, and use of the surface-water resources important to the State, with emphasis on integrated watershed-based approaches. The mission is achieved by collecting, analyzing, archiving, and disseminating objective scientific and engineering data and information; and developing modeling and assessment tools. These data and tools, generated through state-of-the-art scientific methods and research, provide a sound technical basis for the citizens, resource managers, planners, and policymakers of Illinois to make informed resource-management decisions.

## **Vision to 2006**

The Watershed Science Section has a vision of clean and reliable surface-water resources in Illinois being used efficiently to meet societal and ecosystem demands with minimum conflict. Section programs over the next 5 years will focus on watershed, water-quality, and water-supply issues. The Section will continue to be recognized as an expert in these issues and will continue to seek funding to support these programs in collaboration with state, local, and federal agencies.

## **Goals**

- Conduct research to improve our understanding of the hydrologic and biogeochemical cycles as they relate to Illinois watersheds, including rivers, streams, lakes, and wetlands and their interaction and influence on the Mississippi River, the Gulf of Mexico, and Lake Michigan.
- Improve our capabilities to develop, apply, and test existing and new mathematical models that simulate hydrologic and biogeochemical processes based on theory, and field and laboratory data.
- Conduct research to advance our knowledge of the temporal and spatial variability of streamflows in Illinois to address water supply, flood, drought, water quality, instream-flow needs, and watershed-management issues.
- Develop, maintain, and distribute databases on Illinois surface-water resources including water supply and use, low flow and drought impacts, floods and floodplains, streamflow, water quality, lake sedimentation, and stream geomorphology.



- Improve and expand watershed, stream, wetland, and lake monitoring capabilities related to water quantity, water quality, sediment, and geomorphic characteristics and variations.
- Lead the development of the Illinois Rivers Decision Support System (ILRDSS), including coordination among the Scientific Surveys and constituents and the development and integration of models and databases related to climate, hydrologic, hydraulic, and water quality characteristics of the Illinois River watershed.
- Maintain core capabilities to provide technical assistance and information to state agencies, municipalities, professionals, and the general public on water resources issues.
- Effectively convey scientific results to the public in ways that are useful and easy to understand.

### **Strategies**

- Improve our ability to predict the outcome of physical, chemical, and biological processes as they impact water quality.
- Identify, apply, and test new and existing mathematical models to simulate hydrologic and hydraulic processes such as the rainfall-runoff process; seepage into the unsaturated zone; surface water and Groundwater interactions; soil erosion; transport of sediment; fate and transport of nutrients and contaminants; and the hydrodynamic character of rivers and lakes.
- Develop proposals, in cooperation with the Groundwater and Atmospheric Environment Sections, the other Scientific Surveys/Center, and the University of Illinois, to develop mathematical models and monitoring programs to study the physical, chemical, and biological interactions between the atmosphere, surface water, and Groundwater.
- Propose, conduct, interpret, and disseminate results of field and laboratory studies designed to advance our fundamental understanding of the fate and transport of nutrients and contaminants.
- Develop proposals and work to establish programs to monitor hydrologic and sediment budgets for reservoirs, point and non-point pollutant sources, and the impact of watershed and ecosystem management efforts.
- Give increased emphasis to data collection and the application of new data-management and data-archival technologies, as driven by the expanded database needs for numerical modeling and other forms of analyses.

- Seek state funding to develop and sustain core capabilities to provide technical assistance to state and local agencies, municipalities, and the general public on water-quantity and water-quality issues.
- Communicate and disseminate the Section's products by relying upon traditional forms of publication, presentation, and public service, but with increasing emphasis on electronic communications.
- Strengthen collaborative partnerships with other Sections and Units within the Water Survey, other Scientific Surveys, universities, state and federal agencies, and local and regional organizations in recognition of the multi-disciplinary nature of watershed science; and enhance our public outreach activities on watershed issues.
- Support efforts to improve floodplain mapping and its use in Illinois.

#### **Action Items: April 2001 - March 2002**

- Seek additional funding to investigate the fundamental processes affecting the fate and transport of sediment, nutrients, and contaminants.
- Seek additional funding to conduct research and collect data for large rivers including the Illinois, Mississippi, and Ohio Rivers.
- Seek additional funding to relate regional stream geomorphology to effective discharges, sediment loadings, and watershed geology.
- Continue to develop, test, and apply mathematical models to simulate rainfall-runoff, baseflow, tile drain flow, hydrodynamics, soil and streambank erosion, and transport and fate of sediments and contaminants in Illinois watersheds, streams, rivers, and lakes.
- Seek additional funding to test several mathematical models on Illinois watershed, streams, rivers, and lakes to evaluate BMPs and restore natural resources.
- Seek additional funding to accelerate the development of hydrologic, hydraulic, and water quality models for the Illinois River as part of the ILRDSS.
- Develop tools and perform analyses to further characterize the temporal and spatial variability of streamflows in Illinois.
- Seek additional funding to develop, test, and apply regional equations to predict streamflow frequencies at ungaged sites in Illinois.

- Develop improved surface-water, data-collection techniques that better describe temporal and spatial variability of various water-quality parameters in streams for more efficient sampling strategies.
- Develop proposals for conducting in situ watershed experiments to test impacts of land-use changes and the effectiveness of BMPs.
- Expand and improve long-term, instream sediment-transport data collection under the Benchmark Sediment Monitoring Network of the WARM Program.
- Identify, monitor, and evaluate public-water supplies depending on surface water.
- Develop an inventory of information on surface water resources of Illinois.
- Develop stream-habitat BMPs for stream-quality improvement and implement such practices in cooperation with IDNR, IEPA, and other federal agencies. The implementation will include training of respective agency staff.
- Seek additional funding to conduct diagnostic feasibility studies for Illinois lakes.
- Establish an advisory/advocacy panel to review and recommend program improvements and changes within the Section.
- Contribute to the development of plans for regional, county, and statewide water-resources studies.
- Develop, with other Sections, a water-quality plan for the Survey.
- Continue to participate in the nitrogen cycling (NITROMASS) project.
- Implement procedures for improving network security, data and information, and quality management.
- Revise in cooperation with other Sections, section's modeling plan.

## **GROUNDWATER SECTION**

### **Mission**

The mission of the Groundwater Section is to help protect public health and natural resources and support development by providing a scientific basis for planning and decision making on critical groundwater issues in Illinois. This is achieved by conducting research,

collecting and analyzing data, responding to public needs, and serving as the state's primary repository of groundwater records and data. The Section develops and applies appropriate scientific methods and techniques to improve the understanding of the occurrence, quantity, quality, treatment, and use of the state's groundwater resources. The Section also interacts with other programs and agencies in the study of larger hydrological and biogeochemical systems. Results of all data collection efforts and investigations are disseminated to the public in a timely manner through a wide variety of formats.

### **Vision to 2006**

The Groundwater Section will be recognized as a national center of excellence for groundwater research, public service, data archival, and information transfer. The Section will increase its use of state-of-the-art science and technology to promote the protection and responsible use of groundwater resources in Illinois.

### **Goals**

- Increase the number of articles published in the open peer-reviewed literature and the number of presentations at professional meetings.
- Integrate existing statewide data bases with project and external data bases.
- Enhance and expand the Section's groundwater information services to meet customer requirements, and to increase the use of the Section's data and expertise.
- Improve the characterization of groundwater resources in Illinois.
- Expand the use of state-of-the-art water well design, well field optimization, and well maintenance and rehabilitation techniques.
- Increase staff training and personnel resources.
- Strengthen relationships with other scientific programs and agencies to foster multi-disciplinary collaboration.
- Expand program activities and improve its ability to identify and respond to emerging issues.

### **Strategies**

- Complete conversion of UNIX-based data bases to the SQL server.

- Improve data entry and service capabilities, including securing stable funding for “file-room” staff and archiving and scanning of well records.
- Update paper records and, where appropriate, use these data to update computer files.
- Continue mapping potentiometric surfaces within major aquifers such as the Cambrian-Ordovician aquifer system in northeastern Illinois, the American Bottoms of Metro-East, and the Mahomet Aquifer.
- Enhance an active research program on the distribution, fate, transport, and treatment of natural chemicals and contaminants in Illinois groundwater.
- Improve and expand the use of computer technologies in groundwater flow, transport, and geochemical modeling, data archiving, data mining, and data dissemination.
- Improve estimates of sustainable yield of the state’s major aquifer systems and predictions of the effects of changing demands and climate.
- Enhance the water-use inventory program.
- Update the aquifer hydraulic properties data base with information from the Section’s historic files, assess gaps in the spatial distribution of the data, and initiate a program to collect new data where gaps exist.
- Conduct studies of the state’s major aquifer systems and create calibrated models starting with the Mahomet buried valley aquifer and the Cambrian-Ordovician aquifer systems, including collaboration with the ISGS geological mapping initiative.
- Conduct studies to estimate groundwater recharge to our aquifers.
- Expand and improve groundwater and geochemical modeling capabilities and presentation of results.
- Foster improved relationships with Illinois Environmental Protection Agency, Illinois Department of Public Health, Illinois Department of Agriculture, Illinois State Geological Survey, U.S. Geological Survey, U.S. Environmental Protection Agency, Illinois Association of Groundwater Professionals, academic institutions, and regional and local stakeholders.
- Aggressively seek additional funding through new state initiatives, external grants and contracts, and cost-recovery mechanisms.

## **Action Items: April 2001 - March 2002**

- Strengthen collaboration with other sections within the Water Survey.
- Initiate planning for the implementation of a long-term, statewide, groundwater-quality network.
- Expand research and data collection programs related to water well design, maintenance, and rehabilitation.
- Strengthen an active research program in contaminant hydrology for the advancement of techniques and methodologies in site characterization, and fate, transport, and treatment assessments of point and nonpoint sources.
- Encourage presentation of material through a wide variety of formats, including Web pages, oral presentations to stakeholders, and development of short, readily understandable project summaries for wide distribution.
- Develop a groundwater data access and display system .
- Complete a literature review of the hydrogeology of northeastern Illinois.
- Integrate existing sub-regional flow models with aquifer-wide models to incorporate new data for the Mahomet aquifer.
- Collect new data on flow and chemistry in the Mahomet aquifer and coordinate existing data collection efforts.
- Develop a prioritization scheme for major aquifers for targeted investigations.
- Compile and evaluate in collaboration with other agencies existing data on arsenic (state-wide) and chloride (Mahomet).
- Obtain funding for improved characterization of aquifers state-wide.
- Develop plans for the future of the well-drilling program, including the possibility of developing a cooperative well drilling program with ISGS.
- Evaluate the use of GRF resources in the Section.
- Conduct a search for and hire a new Section Head.
- Complete conversion of private-well data base to SQL server and develop Internet access.

- Initiate conversion process of PICS data base to SQL server.
- Bring PICS data base up-to-date.
- Improve representation at regional and statewide meetings and reporting back to staff.
- Increase contacts and membership with national associations, federal agencies, and committees to improve the Section's profile at the national level.
- Clarify the Section's mission, goals, and activities against those of ISGS and USGS.
- Revisit a groundwater constituent/advisory council.
- Include in the job descriptions of researchers a requirement to increase publication of the results of scientific studies within the open peer-reviewed literature, State Water Survey reports, and in papers presented at scientific meetings.
- Inventory projects, data bases, and field networks as a basis for integrating and archiving data.
- Provide input to development of the Illinois River Decision Support System.
- Prepare proposals for groundwater development and well-field design for interested municipalities and agencies.
- Work with groundwater professionals to seek additional funding for making available on the Internet full well construction reports.
- Attend professional courses to increase technical skills.
- Conduct a critical assessment of the Section's collection of groundwater-level data from around the state specifically examining data needs, network design, and observation well inadequacies.
- Develop in cooperation with other Sections, a modeling plan and identify appropriate hardware and software.
- Explore the availability and transfer of IEPA Groundwater data.
- Explore the standardization of well construction reports, well sealing forms, permits, well tests, project archiving, and data collection.

- Implement quality-management plans for data collection activities.
- Design and implement a data backup system.
- Implement procedures for improving network security and data and information management.
- Develop with other Sections a water-quality plan for the Survey.

## **National Atmospheric Deposition Program**

### **Mission**

The National Atmospheric Deposition Program provides quality-assured data and information in support of research on the exposure of managed and natural ecosystems and cultural resources to acidic compounds, nutrients, mercury, and base cations in precipitation and evaluates improvements in its measurement systems, including the addition of other chemical and biological species.

### **Vision to 2006**

NADP will be recognized as one of the nation's premier research support projects comprising scientists serving science and education and supporting informed decisions on air-quality issues related to precipitation chemistry

### **Goals**

- Increase the completeness of the valid wet-only deposition data record by reducing sample loss due to a faulty or failed Aerochem Metrics collector; and, facilitate use of a single collector equipped to capture samples for analysis of major inorganics, nutrients, mercury, pesticides, or other constituents.
- Increase the completeness of the valid precipitation depth record and speed the capture of precipitation data by remote query from the Central Analytical Laboratory (e.g., via telephone, cell phone, radio, or satellite relay).
- Develop a Quality Management Plan including bylaws that document membership criteria for NADP Committees and Subcommittees and set forth rules and procedures for conducting business. (These bylaws will supplant the organizational structure in the current NADP QA Plan.)



- Enhance the usefulness of NADP data by having Geographic Information System (GIS) coverages of related data sets readily available as overlays with NADP data.
- Facilitate use of NADP data in the Illinois State Water Survey's Illinois River Decision Support System, which serves the needs of Illinois scientists and decision-makers.
- Develop a nationwide Mercury Deposition Network consistent with the goals set forth for the MDN in the 1997-2002 NRSP-3 proposal.
- Develop a communications and marketing strategy that is responsive to the evolving interests of NRSP-3 scientists, the public, and decision makers.
- Increase linkages of NADP data with related long-term high-quality data sources.

### **Strategies**

- Replace the Aerochem Metrics wet deposition collector, designed in the mid 1970s, with a robust new collector that can accommodate multiple sampling modules (each module for a different type of chemical deposition) and is equipped with up-to-date mechanical and electrical components.
- Replace the Belfort 5-780 Recording Precipitation Gage (dates to the 1940s) with a gage that measures all precipitation types reliably and accurately (i.e., no significant biases relative to the National Weather Service Standard Gage) and is equipped to produce precipitation measurements as a remotely accessible, digital, electronic signal.
- Prepare a Quality Management Plan that documents how NADP plans, implements, and assesses the efficacy of the quality assurance programs of its networks.
- Develop Web presentations using GIS software and applications to prepare maps and overlays of watersheds, land use/cover, ecoregions, point and area SO<sub>x</sub> and NO<sub>x</sub> pollutant emissions, census information, road and highway distributions, topographic maps, etc.
- Develop data summaries that describe the trends and geographic distributions of wet deposition in the Illinois River watershed.
- Prepare a design plan for a national mercury network and seek federal and state agency, university, and nongovernmental organization support for MDN sites.

- Ensure that NADP remains sensitive to the needs of its sponsors, scientists, the public, and decision makers who need information on the exposure of managed and natural ecosystems and cultural resources to chemical deposition in precipitation.
- Communicate with other monitoring program managers to consider options that may heighten the visibility of these programs on the World Wide Web and ultimately improve data accessibility for the user community.

### **Action Items: April 2001 - March 2002**

- Compare and evaluate candidate collector(s) against the Aerochem Metrics collector, currently used. (The Program Office purchased a new atmospheric deposition collector manufactured by N-Con Systems Company, Inc., Spring 2001).
  - (a) Perform bench tests of candidate collector(s) to ensure that the accepted design specifications are met.
  - (b) Perform field tests of candidate collector(s) to ensure reliable operation and efficient performance.
  - (c) Pending satisfactory results from 4a and 4b, design and conduct field tests of candidate collector(s), deploying the instrument at ~5 selected NADP sites.
- Field test the best available gage(s) for at least one year at ~5 selected NADP sites to evaluate gage performance.
- Prepare a draft QMP for review by the Executive Committee.
- Present QMP for approval by Executive Committee.
- Develop an application that will enable users to submit on-line data queries by watershed and time period (e.g., water year, warm season) and provide data on deposition fluxes and estimated watershed loads.
  - (a) Using the Illinois River watershed as an example, present a draft plan for Data Management and Analysis Subcommittee consideration; and with Subcommittee guidance, select watersheds where this is practical.
  - (b) Implement this application for selected watersheds.
- Add GIS overlays for point and area emissions, population statistics, etc., so that users can examine the relationships between wet deposition and these features.
  - (a) Develop GIS coverages for topography (1:24K) at all NADP (i.e., NTN, AIRMoN, and MDN) sites.
  - (b) Using 1990 census data, develop GIS population coverages.
  - (c) Using the Census Bureau Tiger/Line database, develop GIS coverages for roads within 50 km of every NADP site.

- Prepare seasonal and annual concentration and deposition summary calculations for NTN sites in or near the Illinois River Watershed.
- Apply a spatial objective analysis to the seasonal and annual concentration and deposition values and prepare color isopleth maps of these data for presentation on the Illinois River Decision Support System Web page.
- Prepare time-series plots of Illinois data for presentation on the Illinois River Decision Support System Web page.
- Write a plan for a mercury network with nationwide coverage. Include a rationale and description for selecting sites and for sampling and analytical protocols (A plan for a tri-national MDN was delivered to the Council for Environmental Cooperation; this needs to be expanded).
- Solicit ideas on new data products and needs from the NADP Executive Committee and Subcommittees.
- Seek input from the NADP Executive Committee and Subcommittees in the decisions to develop new products, such as new Web-based data presentations and new brochures.
- Work with the Executive Committee to develop product launch strategies and ways to more effectively announce new product releases.
- Identify key long-term monitoring programs for potential cooperation with NADP on a jointly sponsored Web site linking users to long-term data sets and providing a bulletin board for posting releases of new data and other products.

## **WATER AND ATMOSPHERIC RESOURCES MONITORING PROGRAM**

### **Mission**

The mission of the Water and Atmospheric Resources Monitoring (WARM) Program is to provide a long-term continuous record of the quality and quantity of the state's water and atmospheric resources in cooperation with local, state, and federal agencies, and to provide this information on a timely basis for research and analyses to better understand and manage the interactions of the various water and atmospheric resources and their impacts on Illinois' natural resources and economy.

## **Vision to 2006**

The WARM data collection and analyses will increasingly be automated, quality managed, and disseminated electronically. WARM data will be used for the effective management of resources in the state and the development of alternative sources of energy. The program will actively encourage use of data identified and/or collected by its monitoring activities, and will develop greater use of the Internet for data retrieval, as well as to provide links and access to WARM Program data and other sources of water and atmospheric information. The WARM Program will coordinate with Water Survey researchers and aggressively seek additional funding to upgrade resource monitoring, maintain quality assurance and quality control procedures, enhance data dissemination, and initiate additional water and atmospheric resources monitoring activities where deficiencies are identified and continuous long-term monitoring is appropriate.

## **Goals**

- Ensure continuous, long-term collection, archival, and dissemination of high-quality data on the water and atmospheric resources of Illinois.
- Enhance and extend the physical measurements of our water and atmospheric resources across all parts of the state.
- Analyze and present the temporal and spatial variations in the data and participate in the determination of how these trends may alter the state's current water and atmospheric resources.
- Participate in inter-Survey collaborations in accordance with the joint Surveys Strategic Plan, particularly in activities related to restoration of the Illinois River watershed.
- Collaborate with other environmental monitoring agencies inside and outside of Illinois in order to share information and minimize duplication of effort.
- Assure that future long-term monitoring activities of the state remain consistent with monitoring needs.

## **Strategies**

- Establish procedures and guideline criteria to determine how and under what conditions long-term monitoring activities will be continued or added to the WARM Program.
- Scrutinize current WARM Program networks to develop procedures to alter data collections where the present design is determined as inadequate.

- Develop and implement quality-assurance and quality-control procedures.
- Construct an interactive WARM Program home page to display the water and atmospheric data monitoring activities in Illinois with links to other home pages or sources of similar data.
- Develop working relationships with other Illinois agencies that monitor water and atmospheric resources of the state to foster two-way sharing of collection procedures and analyses of data in order to maximize data collection efficiencies and the number and quality of variables monitored within the state.
- Improve data quality and delivery by adopting advances in instrumentation and data downloading technologies.
- Submit data analyses and findings using WARM Program data for publication in refereed journals and for presentations at professional meetings.
- Participate in regional and national field programs. (The baseline nature of the current WARM networks allow data to be used in assessing event frequencies and background trends upon which short-term data sets are superimposed.)
- Seek internal and external funding to enhance water and atmospheric resource monitoring.
- Improve public awareness.

### **Action Items: April 2001 - March 2002**

- Develop an annual implementation plan of WARM Program activities with timelines and task assignments in accordance with the WARM Program Strategic Plan.
- Finalize a WARM quality assurance plan.
- Expand near real-time water and atmospheric data on the Internet. Monitor users accessing WARM Program data to determine the frequency and expertise of Internet site visitors as a measure of evaluating the usefulness of products. Develop links to other Internet sites inside and outside the Water Survey.
- Provide daily access to WARM's soil temperature data in support of agricultural activities in Illinois related to appropriate post harvest chemical application.
- Expand and improve reservoir monitoring through installation of staff gages and development of Internet access to data in a user-friendly format.

- Make contacts with other environmental monitoring groups outside the Water Survey to enhance the efficiency of data collections, disseminations, and coordination of efforts.
- Prepare a brochure to describe explicitly what is included in the WARM Program and to inform users how to access data.
- Seek to establish new sediment and nutrient sampling stations in the Illinois River basin and pilot watersheds coordinated with Watershed Sciences Section.
- Install a geographically based selection procedure of inventoried items of WARM's inventory of water and atmospheric databases.
- Conduct seminars on the WARM Program.
- Provide input to the development of the Illinois River Decision Support System.

## **OUTCOMES**

The Water Survey disseminates data and information either because they are of broad general interest, or because specific clients have requested specific data and information. The Water Survey has no control over the use of data and information once they are disseminated. However, it is how the data and information are used by customers and constituents that determines the outcomes of all the work done by the Water Survey. The Water Survey does not specifically track and analyze the outcomes of its work, but knowledge of issues and problems and frequent customer interactions allow the Water Survey to make the following reasonable estimates of outcomes:

### **A. WITHIN THE WATER SURVEY**

- Mission accomplishment.
- Safe work environment.
- Merit performance.
- Efficient and effective use of resources.
- Quality products, research, service, data dissemination, and outreach.

### **B. OUTSIDE THE WATER SURVEY**

- Restoration and protection of the environment.
- Improved public health.
- Adequate and safe drinking water.
- Swimmable, fishable, and navigable waters.
- Economic development.
- Reliable and safe energy production and distribution.

All these outcomes have significant environmental, social, and economic benefits for Illinois and the nation.