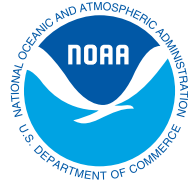


Illinois-Indiana Sea Grant **Strategic Plan 2009 - 2013**



**Illinois-Indiana Sea Grant Strategic Plan 2009 - 2013**

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*This publication was produced by the Illinois-Indiana Sea Grant College Program. Funding is provided by the National Sea Grant College Program, National Oceanic and Atmospheric Administration, U.S. Department of Commerce under Grant No. COM NA10OAR4170068.*

*Illinois-Indiana Sea Grant is a joint federal and state program at the University of Illinois Urbana-Champaign and of Purdue University, West Lafayette. Purdue University and the University of Illinois provide equal opportunities in programs and employment.*

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*Publication No. IISG-10-03*



**I L L I N O I S**

**PURDUE**  
UNIVERSITY

## **Introduction**

**I**llinois-Indiana Sea Grant (IISG) is one of 32 college programs nationwide, and is dedicated to conducting research, education, and outreach to serve Lake Michigan's southern coast. With a mandate to bring the latest university-based science to those who need it, IISG brings together scientists, educators, policy makers, community decision makers, outreach specialists, business leaders, and the general public to work towards a sustainable environment and economy. Sea Grant addresses real issues facing our coasts, including: developing ecosystem-based approaches to resource management; supporting sustainable development; ensuring adequate, safe and sustainable seafood supplies; and preparing communities for the effects of climate change.

The Sea Grant program is a partnership between state institutions and the U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Illinois-Indiana Sea Grant is a partnership between the University of Illinois and Purdue University, with specialists in seven institutions in the two states.

The program serves the following users:

- Resource users – coastal residents, coastal businesses and industries, lake food consumers, tourists, and recreationists
- Policy makers – government and municipal officials at all levels
- Information users – natural resource professionals, museum and aquarium planners and visitors, environmental leaders, industry managers, reporters, citizen leaders, retailers, aquaculture producers and marketers, educators, and university researchers

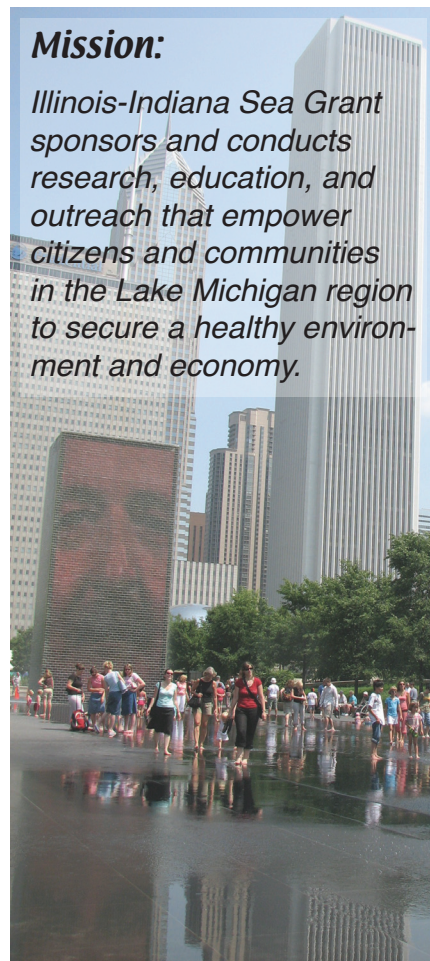
This plan is a modification of our 2006-2010 strategic plan. At the request of the National Sea Grant Office (NSGO), we revisited our plan in light of the new national strategic plan. The result of that alignment exercise is this document. During the alignment process we examined how we organized our activities. Conceptually our focus areas meshed well with national focus areas. To align, we adopted the names use in the national plan. We reviewed our objectives, moved finished ones to the impacts, and added new objectives to reflect new directions and projects. We also revised the dates of our plan to coincide with those of the national strategic plan. As such, our plan now extends through 2013.

The plan was designed and has been reviewed using both a top-down and bottom-up approach. Our process in developing and vetting this plan included the following steps:

1. Our specialists serve on committees with and for user groups and stakeholders. Through this participation, they have been able to keep a finger on the pulse of the community and they used that input to craft topics and objectives.
2. The IISG director visited with each of the external advisory committee members individually and gathered his or her input on information gaps, needs, and important partnerships. Those suggestions were used in crafting our objectives.
3. We looked at the priorities set out by the NSGO and determined which of our priorities best fit with the national strategic plan and focused on those areas. The NSGO reviewed and twice commented on this plan.
4. Through the 2010-2014 omnibus process, our focus areas and

### **Mission:**

*Illinois-Indiana Sea Grant sponsors and conducts research, education, and outreach that empower citizens and communities in the Lake Michigan region to secure a healthy environment and economy.*



objectives were peer reviewed and we incorporated those comments.

5. We formally convened our external advisory committee to review the plan and incorporated those suggestions.



This strategic and implementation plan is designed as one cohesive and comprehensive document. The strategic component describes goals and objectives of the program for 2009-2013 in each topic area as well as provides details of activities that will achieve them. The implementation component is integrated throughout this document. This approach to strategic planning and implementation provides an opportunity to outline in one document the action steps and general strategies necessary to carry out the objectives identified for each topic area. The action steps that are needed to collect performance data and to evaluate progress are described below each objective. More detailed descriptions of how we plan to achieve our objectives can be found in our four-year, peer-reviewed omnibus proposal. We have included detailed performance measures for each objective from the omnibus proposal.

## Organization

IISG focuses its resources on local topics that also address national priorities. Our objectives fall within the focus areas outlined in the National Sea Grant Strategic Plan.

- Healthy Coastal Ecosystems
- Safe Sustainable Seafood Supply
- Sustainable Coastal Development
- Hazard Resilient Communities

Allocation of resources within our focus areas is as follows: about 30 percent to Healthy Coastal Ecosystems, 43 percent to Sustainable Coastal Development, 23 percent to Safe Sustainable Seafood Supply, and 5 percent to Hazard Resilient Communities.

We have further categorized our efforts into specific topics, which include:

National Focus Areas	IISG Topics	Personnel	
<i>Healthy Coastal Ecosystems</i>	<i>Aquatic Invasive Species</i>	Aquatic Invasive Species Specialist	
	<i>Coastal Restoration</i>	Aquatic Ecology Specialist Coastal Sediments Specialist	
	<i>Great Lakes Health</i>	Great Lakes Ecosystem Specialist	
	<i>Great Lakes Literacy</i>	Aquatic Ecology Specialist Education Specialist	
	<i>Sensible Disposal</i>	Coastal Sediments Specialist Great Lakes Ecosystems Specialist	
	<i>Water Quality</i>	Aquatic Ecology Specialist	
	<i>Safe Sustainable Seafood Supply</i>	<i>Aquaculture</i>	Aquaculture Marketing Specialist
		<i>Fish Consumption</i>	Aquatic Ecology Specialist Education Specialist
		<i>Land Use Planning</i>	Environmental Planning Specialist Planning with POWER Leader Extension Program Leader
	<i>Sustainable Coastal Development</i>	<i>Water Supply</i>	Water Resource Economist
<i>Climate Change</i>		Aquatic Ecology Specialist	
<i>Hazard Resilient Communities</i>			

Within each topic, we perform three overarching functions: research, outreach, and education. IISG staff members work closely together to integrate these functional areas, and thus achieve the maximum impact for the southern Lake Michigan community. Program administration, in the form of a Program Management Team, facilitates activities in each topic and functional areas and provides support and leadership in developing new opportunities that expand the scope of our program.

## **Objectives**

All IISG objectives are SMART (specific, measurable, audience directed, realistic and time bound) and were developed using the logic model. Unless otherwise noted, progress towards achieving each objective is determined by tracking performance measures, when possible from readily accessible secondary sources.

### *Research Objectives*

We have included research objectives within most of our topics. As a consequence of the Great Lakes Regional Research Information Network (GLRRIN) Lake Michigan Food Web Workshop, conducted during the summer of 2008, several important research needs were identified. Illinois-Indiana Sea Grant and the University of Wisconsin Sea Grant Institute will pursue research to fill knowledge gaps in the two most pressing areas: 1) bioenergetics of non-commercial and non-recreational fish species, and 2) the current status and trends of nutrient inputs to Lake Michigan with an emphasis on large rain events and processes at the land-water interface. The research objectives in this plan reflect these goals.

As this is a four year plan, we have also included research objectives outside of the GLRRIN scope to match our program's needs and strengths. These objectives are included as part of many of our topics and will be addressed in both the formal call for proposals in 2011 and through support of development projects and graduate students.

### **A Living Document**

We have assigned primary responsibility for each objective in this plan to one or more of our program staff members. These objectives appear in each individual's annual plan of work and will be reported on each year in annual reports. Progress towards these objectives is monitored by the director and extension program leader through annual performance appraisals.

Objectives have different time horizons. As such, this is a living document. Completed objectives will become impacts and objectives for new activities and funding opportunities will be added in an ongoing manner. Changes will be made through consultation with the program management team, external advisory committees, and relevant program personnel.



## Healthy Coastal Ecosystems

IISG initiatives in this NSGO focus area include these topics: aquatic invasive species, coastal restoration, Great Lakes health, Great Lakes literacy, sensible disposal of medical and e-waste, and water quality.

IISG has set the following goals and strategies for our work in the area of Healthy Coastal Ecosystems.

**Goal: To conduct and coordinate research and outreach to support ecosystem-based approaches to managing Great Lakes coastal environments.**

Strategy: Conduct and apply research to improve ecological services, existing environmental conditions, and future Great Lakes health.

Strategy: Work with other Great Lakes programs to fill information gaps related to the Lake Michigan food web, pharmaceuticals in the environment, and other areas of concern.

Strategy: Develop methodologies, standards, and indicators to support ecosystem-based management approaches and guide future management efforts.

**Goal: To increase ecosystem-based approaches to management of land, water, and living resources in the Great Lakes through improving environmental understanding and literacy.**

Strategy: Enhance the environmental literacy of students (K-12 and college) and teachers in the Great Lakes region by developing curriculum, teaching classes, and building web-based resources.

**Goal: Improved ecosystem function along the southern Lake Michigan coastline.**

Strategy: Develop methods to remove contaminants and design solutions to decrease the impact of contaminants along Lake Michigan.

Strategy: Invest in the development and dissemination of tools to help decision makers and resource managers make better decisions about preventing the spread of aquatic invasive species, stream restoration, and beach closures.

Strategy: Develop and disseminate information to business owners and citizens that will help them make better decisions about disposal of unwanted medicines, electronics, and other waste streams.

Strategy: Make data from the U.S. EPA Great Lakes National Program office (GLNPO) more readily available to decision makers and citizens.

Strategy: Provide technical support for local officials and health departments with respect to on-site waste treatment and mitigation of contaminated sediments.

Strategy: Provide support for water garden suppliers and recreational water users that will help prevent the spread of aquatic invasive species.

***We have written SMART objectives to help us reach these goals. They are organized by topic.***



## Aquatic Invasive Species

Over 180 non-native species have been introduced into the Great Lakes region. Some of these species, such as the zebra mussel, Eurasian watermilfoil, and silver carp, have flourished and negatively impacted both our environment and economy. More aquatic invasive species (AIS) like these lurk on the horizon as threats to Lake Michigan and the inland waters of both Illinois and Indiana.

AIS can be introduced and spread through a variety of pathways, including those associated with recreational water users, water gardeners, aquarium hobbyists, and nursery trade personnel. For example, when an angler releases bait fish at the end of a day's fishing or a water gardener disposes of excess plants in a local waterway, they could also be introducing AIS. Most of these individuals are unaware of the risks their actions pose to our waterways. Therefore, over the next five years, IISG will target user groups with outreach designed to provide the information and motivation they need to change AIS-risky behaviors. By working to change their behaviors, we will be working to reduce the risk of introduction and spread of AIS.



*Courtesy of Jason Lindsey*

We expect the following outcomes from our work with aquatic invasive species:

- Communities will improve planning and, in turn, improve ecosystem health along southern Lake Michigan.
- Lake Michigan water garden suppliers and resource managers will have tools to predict the outcome of behavior on the coastal environment.
- Students and their families will understand the impact of their behavior on the Lake Michigan coastline and how to minimize that impact.
- Sound scientific information will be available to help resource managers, law makers, and residents make informed decisions about mitigating aquatic invasive species.
- Businesses, recreational water users, teachers, and others will use ecosystem-based approaches to minimize their impact on Lake Michigan.

## Outreach Objectives and Action Plans

1. By 2012, 80 percent of the eight independent water garden suppliers in Indiana will have management practices that help prevent the spread of AIS into natural ecosystems.

*IISG will work with individual water garden suppliers in Indiana to ensure that their daily operations include management practices that help prevent the spread of AIS.*



- By 2013, Illinois will augment policies that prohibit possession of species (including those not currently in trade) that are capable of invading Illinois waters.

*IISG will work with the City of Chicago Department of Environment, the Illinois AIS coordinator, and interested stakeholder groups to consider potentially harmful aquatic species in possession and trade policies.*

- By 2013, Indiana will have a process for assessing the risk for invasion of aquatic plants and will have a list of species that are prohibited for use and sale within the state.

*IISG will assemble and host a working group for aquatic plants in trade that will establish the process by which plants are assessed in Indiana, and will facilitate the assessment of plants for the state.*

- By 2010, 80 percent of eight independent water garden suppliers in Indiana will collaborate with IISG to educate consumers about invasive aquatic plants, thus helping prevent the spread of AIS into natural ecosystems.

*IISG will use the working group to identify the leading water garden suppliers in Indiana and will then work with and provide resources for these suppliers to educate their employees and customers about AIS.*

- By 2013, 60 water gardeners in Indiana will be aware of invasive aquatic plants and know activities that can affect the introduction and spread of invasive plants.

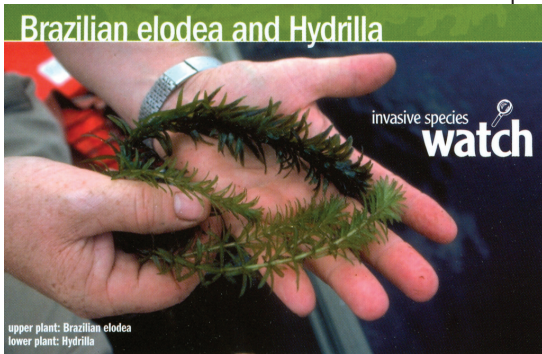
*IISG will survey both the aquatic plant working group and Indiana water gardeners to determine outreach needs; IISG will then develop and deliver outreach tools for both consumers and retailers via major retail outlets. Water gardeners will be surveyed at key venues to determine their knowledge of invasive plants as well as behaviors that can reduce the spread of invasive plants.*

- Through 2013, the percentage of the 350 recreational water users surveyed in southern Lake Michigan that routinely practice precautionary steps to prevent the spread of AIS from their recreational activities will be maintained at 50 percent, even as new water users begin to ply Lake Michigan.

*IISG will develop a variety of products for recreational water user audiences, including: a website for information sharing and reporting of AIS; development and placement of signs at boat ramps; fact sheets; and informational products designed for recreational water users that provide steps to reduce the spread of AIS. These products will be delivered through bait, tackle, and boat dealerships; sport shows, and lake association meetings. Questions appended to a creel survey will be used to monitor the percentage of recreational users in southern Lake Michigan that routinely practice precautionary steps to prevent the spread of AIS.*

- By 2013, 75 percent of our seven biological supply house partners will incorporate a “don’t release” message with their live specimen shipments.

*IISG will partner with biological supply houses to create outreach tools with a “don’t release” message to accompany live specimen shipments.*



- By 2012, 60 University of Illinois students will collaborate with local youth on community stewardship projects that raise awareness and understanding about the control, spread, and impact of invasive species.

*IISG will develop college-level service-learning courses with the Center for Teaching Excellence. These courses will provide opportunities for University of Illinois students to learn about the serious ecological and socio-economic impacts of aquatic invasive species, to teach school children about these issues, and to collaborate with youth on community stewardship projects that raise awareness and understanding about the need for a balanced approach to the use and protection of aquatic ecosystems. The project will use IISG’s Nab the Aquatic Invader! curriculum in educational initiatives involving elementary, middle, and high school classes in Champaign and Urbana. The project will assess learning outcomes for youth as well as outcomes for the development of undergraduate student participants.*



- By 2013, IISG will educate at least 150 teachers about the “AIS in classrooms” pathway for spreading aquatic invasive species and close this pathway by getting teachers to follow recommended disposal methods for live specimens.

*IISG will investigate current science lab and aquaculture classroom practices and develop appropriate tools and products targeted specifically for stakeholders (teachers, curriculum specialists, those in Regional Offices of Education/ Regional Science Centers who have responsibility for setting policy for science lab instruction, and biological supply house personnel).*



- By 2011, the *Nab the Aquatic Invader!* web site will be accessed by 2,000 classrooms.

*Since 2006, we have conducted professional development workshops for 204 teachers and non-formal educators. Four teachers from the Champaign-Urbana area participated in a service-learning course where Nab the Aquatic Invader! was used extensively. We estimate that 1,470 classrooms have accessed this site in the last four years.*

*In 2010, we will send a short survey to all previous participating educators to follow up on their use and application of the site.*



### Research Needed to Solve Contemporary Problems

- Develop protocols, decisions tools, techniques, and policy options to prevent the dispersal and introduction of existing and new invading species.

### Coastal Restoration

Years of industrial activity and increased urbanization have left many lakes and rivers contaminated with nitrogen, heavy metals, PCBs, and other toxic pollutants. Also, many rivers and streams have been dammed, channelized, or diverted to suit local needs. The result is that many aquatic ecosystems are stressed and degraded—unsafe for people

and unsuitable for some wildlife. Sea Grant is working to restore these waterbodies through development and implementation of restoration techniques that will improve coastal health and ensure continued enjoyment and use of coastal resources by the public.

We expect the following outcomes from our work in coastal restoration:



Courtesy of Steve Pescitelli

- Research will result in data, standards, and indicators usable by resource managers and decision makers in southern Lake Michigan.
- IISG will develop tools to help resource managers understand the consequences of ecosystem degradation and how to mitigate the impacts.
- Great Lakes sites will develop master plans to restore degraded ecosystems.
- Great Lakes residents, business people, and resource managers will have and use IISG-supported tools to preserve or restore local natural resources.
- Great Lakes communities will have improved ecosystem function.

### **Outreach Objectives and Action Plans**

1. Through 2013, restoration project managers will learn about and adopt stream restoration technologies and techniques, resulting in more effective restoration and management efforts.

*IISG will partner with the Chicago Wilderness Consortium to conduct an annual conference that draws upon national experts who will present the latest scientific findings on stream restoration and dam management to natural resource managers in Illinois and Indiana. A steering committee composed of resource managers in both states will help identify key topics and organize the conference.*

2. By 2010, ten communities in U.S. EPA Great Lakes Areas of Concern will make informed decisions about contaminated sediment removal or management practices and will begin to implement selected steps.

*IISG will work with the U.S. EPA GLNPO scientists to develop outreach products and programs designed to help communities assess their risk from contaminated sediments and to weigh management options that address the human health and ecosystem impacts of these contaminants. Facilitation will be provided and programs will be held in partnership with local citizen action groups in Areas of Concern that are considering Great Lakes Legacy Act funding to address sediment removal in their community. Community action in response to programming will be documented by response to and participation in the Legacy Program.*

3. By 2013, 13 Great Lakes Legacy Act sites will have developed and adopted ecological restoration master plans.

*IISG will meet with local landowners to help educate them about the ecological restoration master plan creation process and gain input to ensure that their ideas are represented in the plan. In essence, we will be the “honest broker” between the local community and the environmental consulting firm hired by EPA to author the plan.*

### **Research Needed to Solve Contemporary Problems**

1. Develop new approaches and technologies to improve the effectiveness of coastal ecosystem restoration.
2. Develop methods for removal of contaminants from sediments along Lake Michigan.

### **Great Lakes Health**

The Great Lakes are a globally important natural resource. They represent approximately 20 percent of the world’s fresh surface water and provide habitat for over 100 species of rare plants and animals. Additionally, 42 million people depend on the Great Lakes for their drinking water.

Unfortunately, the ecological integrity of the lakes is significantly stressed. Within the past few decades, chemical and microbial contamination and the introduction of invasive species have led to the decline of native fish and wildlife populations and degradation of water quality and habitats.

IISG seeks to minimize the impacts of anthropogenic stressors on the lakes. We expect the following outcomes to result from our work in the region.

- Illinois and Indiana decision makers and resource managers will have a network of water resource professionals through whom data needs can be assessed and met.
- Data and resources from GLNPO, including both monitoring and trend data, and the burn barrel tool kit, will be available to and used by Great Lakes residents and decision makers for ecosystem-based planning and management decisions.

### **Outreach Objectives and Action Plans**

1. By 2013, all Great Lakes states will be provided annually with GLNPO and Great Lakes Observing System (GLOS) products and resources, including science-based research from Great Lakes monitoring and trend data, and given the tools to begin to consider policy or management options that improve ecosystem management

*IISG will work with GLNPO, GLOSS, and Environment Canada to transfer State of the Great Lakes Ecosystem Conference (SOLEC) results and other data, which identify environmental risks still impairing the safety of Great Lakes drinking water, swimming, and fish consumption, to legislators and agency managers in all Great Lakes states. IISG will work with decision makers and help them access the latest scientific data as they consider future priorities and action steps in their decision process.*

2. By 2013, a management model that predicts the impacts of invasive species on the Lake Michigan food web will be developed and made available to Lake Michigan managers as a result of IISG's leadership and oversight of the Lake Michigan GLRRIN committee.

*IISG will convene the Lake Michigan GLRRIN steering committee at least twice per year to coordinate data collection and model development. All agencies are concentrating field data collection in Lake Michigan in 2010. In addition, Wisconsin Sea Grant and Illinois-Indiana Sea Grant issued a joint RFP and together will fund research projects in 2010-2012 that make contributions to the Lake Michigan management model development. Agency representatives and researcher groups will be convened as necessary to facilitate data sharing and coordinate additional data collection.*

### **Research Needed to Solve Contemporary Problems**

1. Develop methodologies to evaluate ecosystem-based management approaches and guide future management efforts.
2. Develop standards and indicators needed to support ecosystem-based approaches.

### **Great Lakes Literacy**



Populations and built environments in coastal watersheds are growing rapidly, with 55 percent of the U.S. population already living within 50 miles of the coast. To become well-informed decision makers, it is important that youth understand the importance of balancing natural resource protection with sustainable economic growth. Sea Grant education efforts are directed toward students and educators, grades K-16, and to graduate-level students through our fellowship programs. It is our goal to create an informed public that understands the value and vulnerability of our Great Lakes and marine resources. We offer programs and products that build awareness, knowledge, and skills, which leads to new attitudes that will increase one's ability to engage in personal and collective action.

We expect our work to result in the following outcome:

- Students and their families will understand any negative impact from their behavior on the Lake Michigan coastline and how to minimize these impacts.

### **Outreach Objectives and Action Plans**

1. By 2013, colleges and universities in the Calumet region will develop and enroll students in a multi-university, interdisciplinary environmental degree program.

*IISG will partner with universities, state and federal agencies, and non-governmental organizations in the Calumet region (the area around the southern tip of Lake Michigan) to discuss and develop an environmental program that pools the strengths of each institution, thereby allowing students access to a more robust environmental program. By working together at the regional level, the steering committee anticipates that local citizens will be engaged in the restoration of natural areas. This cooperation will build a biodiversity-*

*literate public in the Calumet area more successfully than any one university can do on its own.*

2. By 2013, two new aquatic ecology classes will be taught to students at Purdue University Calumet.

*To fulfill Illinois-Indiana Sea Grant's mission and provide a service to the Department of Biology, two new classes have been developed. Both classes, Aquatic Ecology and Aquatic Invasive Species Ecology, provide students with research information from current journals as well as field techniques from relevant experts. Also, professionals are asked to guest lecture to discuss their research. The courses undergo revisions and updating annually. This experience gives students exposure to an area of study that they probably would never consider at Purdue University. These classes are taught once every three years.*

3. By 2012, a new *Fresh & Salt* collection of Great Lakes and marine activities will be used in over 200 science classrooms throughout the U.S. to supplement their biology, earth science, and environmental science curricula.

*On behalf of the Centers for Ocean Science Education Excellence (COSEE) Great Lakes, IISG is coordinating the development of this Fresh & Salt curriculum collection and will be implementing a marketing and distribution plan to ensure that it reaches a wide array of classrooms in all regions of the U.S. In addition, education staff members will be demonstrating the activities in this collection at numerous teacher workshops and conferences.*

## **Sensible Disposal**

From time to time, we all have things we no longer want or need – from expired medicines to outdated computer equipment. But how we get rid of stuff can make an impact on the health of the environment. IISG has developed a series of toolkits and initiatives to help communities, schools, or individuals wisely deal with unwanted medicines, e-waste, or trash burning. By safely disposing, recycling, or donating many unwanted items, people can help protect the Great Lakes ecosystem and our drinking water quality.

We expect our work in this area to result in the following:

- Data and resources from GLNPO, including the burn barrel tool kit and both monitoring and trend data, will be available to and will be used by Great Lakes residents and decision makers for ecosystem-based planning and management decisions.
- Residents of Great Lakes states will keep pharmaceuticals out of waterways by properly disposing of unwanted medicines.
- Sound scientific information will be available to help resource managers, law makers, and residents make informed decisions about reducing contaminants in sediments, wetlands, and other sinks.
- Businesses in the Great Lakes states properly dispose of electronics waste.
- Great Lakes residents, businesses and resource managers will have and use IISG-supported tools to preserve or restore local natural resources.

## Outreach Objectives and Action Plans

1. By 2010, 200 residents in four of the eight Great Lakes states (IL, IN, MI, and PA) will be educated about disposal of unwanted medicines.

*IISG will co-sponsor workshops for solid waste managers, waste water treatment operators, pharmacists, doctors, and community organizers in Indiana, Michigan, and Illinois to introduce them to the toolkit— Disposal of Unwanted Medicines: A Resource for Action in Your Community—and to help them plan medicine collection strategies for their communities. We will also exhibit our toolkit at state-wide township meetings in Ohio and Pennsylvania to help achieve this goal.*

2. By 2011, the IISG unwanted medicine resource kit will be recognized as a leading resource that communities can use to assist them in the collection and disposal of unwanted medical waste in the Great Lakes basin and will have been distributed and used widely to guide 20 ongoing and one-day collection events.

*IISG will partner with local communities and state agencies in six of the eight Great Lakes states (IL, IN, PA, NY, WI, MI) to help provide educational resources and/or funding to communities to help them begin programs to safely collect and dispose of unwanted medicines.*

3. By 2010, 25,000 small- and medium-sized businesses in the Great Lakes basin will use the e-cycling website to green the lifecycle of their computers.

*Informational booths and/or presentations promoting [ecyclingtools.com](http://ecyclingtools.com) for small- to medium-sized businesses will be staffed at two national conferences (Consumer Electronics Show, Las Vegas, NV and GREEN Procurement Exposition & Conference, Chicago, IL). The [ecyclingtools.com](http://ecyclingtools.com) website and resources will be disseminated widely across the Great Lakes basin through website promotion and through local Chamber of Commerce business meetings in communities around the Chicago area.*

4. By 2010, the resource kit, *Learn Not to Burn: A Guide for Reducing Trash Burning in Your Community*, will be presented in four of the eight Great Lakes states.

*Informational booths and/or presentations promoting the resource kit will be staffed at conferences and workshops in OH, PA, WI, IL. The resource kit website will be updated on a quarterly basis to reflect changing regulations, case studies and new information. Sea Grant specialists will respond to communities' requests to provide further information on this topic and support local efforts to educate their community members on issues relating to backyard burning.*

5. By 2011, IISG will inform 1500 youth and 200 families about the harmful effects of unwanted medicine and other household chemical products and the importance of properly disposing of these potentially toxic substances.

*A 4-H project guide targeted to members in 8-12 grades (junior leader groups) will be developed. Partners include the 4-H state curriculum coordinators in Illinois and Indiana. The 4-H youth will conduct research to find out what's going on in their community regarding disposal*



practices and medicine collections, if anything. Kids can brainstorm about how to get the word out and share the important messages about sensible disposal. Leaders will prompt the kids with questions so they can reflect on the possibilities. The guide will be packaged so it's accessible and fluid and will be organized so leaders can easily teach their members. The 4-H youth will gain skills in citizenship, leadership, teamwork, and environmental stewardship.

### Research Needed to Solve Contemporary Problems

1. Design solutions to decrease the impact of contaminants, including complexing chemicals (e.g. toxins) on coastal, aquatic, and wetland communities.
2. Determine levels of animal and human pharmaceutical wastes in aquatic environments.

### Water Quality

Water quality affects everyone, yet our water resources can be impaired by contamination and runoff due to industry, a heavy population density, and a myriad of land and water uses. At stake are safe drinking water, clean beaches, and uncontaminated aquatic ecosystems. With many threats to water quality, IISG tackles the issue from a variety of fronts. Through pollution prevention programs, land use planning resources, restoration workshops, and the latest research results and monitoring data, IISG reaches out to audiences that can make a difference in protecting or restoring water quality.

Our work in this area will result in the following outcomes:

- IISG research will be translated into applications and applied by resource managers in the region.
- Communities will improve planning and, in turn, improve ecosystem health along southern Lake Michigan.
- Lake Michigan resource managers will have tools to predict the outcome of behavior on the coastal environment.
- Sound scientific information will be available to help resource managers, law makers, and residents make informed decisions about improving water quality.



### Outreach Objectives and Action Plans

1. By 2013, local officials and health departments in the three Indiana coastal counties will review their on-site waste treatment ordinances and make changes necessary to reduce the number of failing systems that contribute bacterial disease and pathogens to near shore waters.

*The Planning with POWER program will present research-based information regarding the risks posed by current on-site waste management systems to planning commissions, watershed groups, and other interested parties. Research-based alternatives will be explored and case studies of management and policy options will be presented. Facilitation and continued technical support will be provided to working committees in each county as they consider and address this issue in their counties.*



2. By 2013, Indiana and Illinois resource managers will have access to real-time beach water quality monitoring tools produced by IISG-funded research.

*IISG will partner with funded researchers and the appropriate state agencies to develop programs that engage local beach managers in using the outcomes of the funded research. Also, IISG will work with state agency officials and the researchers to develop a program for the 2011 Great Lakes Beaches Meeting.*

3. By 2013, IISG will develop a manual addressing specific beach and beach closure issues for beach managers.

*Working with the Great Lakes Sea Grant Network and the Great Lakes Beach Association, the concerns and questions of beach managers around the Great Lakes will be addressed in a training manual.*



### **Research Needed to Solve Contemporary Problems**

1. Determine the fates and effect of toxic chemicals and biological contaminants in nearshore waters, in the wetlands of southern Lake Michigan, and in selected inland waters.
2. Quantify sources of non-point source pollution from agriculture, urban runoff, and shoreline development; quantify trophic level impacts; and develop improved control procedures.

## Safe and Sustainable Seafood Supply

To address this NSGO focus area, our topics include aquaculture and fish consumption. IISG has set the following goals and objectives for our work within Safe and Sustainable Seafood Supply.

**Goal: An aquaculture industry in Illinois and Indiana that provides safe, sustainable seafood at affordable prices.**

Strategy: Conduct integrated education and outreach to support aquaculture efforts in Indiana and Illinois.

**Goal: A network of resources available to support aquaculture producers, processes, and markets.**

Strategy: Support research to find innovative methods for raising cool-water species of fish and crustacean in Illinois and Indiana.

Strategy: Develop marketing and business tools and production strategies to help expand the aquaculture industry in Illinois and Indiana.



**Goal: Residents of Illinois and Indiana understand how to select fish to feed their families.**

Strategy: Develop and evaluate education programs to raise awareness of the nutritional benefits and risks associated with fish.

**We have written SMART objectives to help us reach these goals. They are by topic.**

### Aquaculture

In a time when fish from oceans and other waterways are being harvested at unsustainable rates, aquaculture has become the fastest growing food production industry in the world, and a major industry in the United States. But less than one percent of the farm-raised seafood consumed in the U.S. is produced in the Midwest. Through workshops, educational materials, and one-on-one interactions, Illinois-Indiana Sea Grant is helping aquaculture producers in the two states define markets and create value-added opportunities for their products.

IISG's work in aquaculture is expected to result in the following outcomes:

- A robust aquaculture industry will exist in Illinois and Indiana.
- The AquaNIC portal will continue to provide visitors around the world with the latest and most reliable aquaculture information.
- Aquaculture producers will have access to alternative and more sustainable fishmeal.

### Outreach Objectives and Action Plans

1. By 2013, Illinois and Indiana aquaculture producers will have access to production and marketing information that enables them to operate profitable businesses.

*IISG will partner with aquaculture industry associations, Purdue*

*University, and University of Illinois Extension to conduct state-wide workshops on various aquaculture production methods, production management, and marketing. Workshops will include practical hands-on activities on indoor recirculating systems, cage construction and production, and outdoor fish pond culture.*

2. By 2013, 10 new aquaculture facilities will start operations in Illinois and Indiana.

*The availability of investment decision tools regarding enterprise budgets, start-up costs, and profit potentials as well as the opportunity to participate in practical hands-on activities related to indoor recirculating systems, cage construction and production, and outdoor pond culture of fish will assist prospective producers in beginning new aquaculture operations.*

3. By 2010, the AquaNIC website will be redesigned to ensure that it continues to reach 2.5 million visitors per year and serves as a premiere gateway to the world's electronic aquaculture resources.

*LaDon Swann (Mississippi Alabama Sea Grant Consortium and managing partner for AquaNIC) has secured funding from NOAA for the stated goal of updating both the appearance and content of AquaNIC. Programmers at Auburn University have been hired to upgrade the appearance, use modern scripting languages, and incorporate modern technologies. An Auburn professor emeritus has been hired to review, update, and expand the content on AquaNIC. AquaNIC is currently ranked the #1 electronic aquaculture resource in the world. With these revisions, the site will attract new visitors to its already large customer base.*



4. By 2010, enterprise budgets, start-up costs, profit potentials, and other investment decision tools will be available online to everyone contemplating an aquaculture venture.

*IISG will partner with aquaculture industry associations, Purdue University, and University of Illinois Extension to produce an information packet and web-based resource for first-time aquaculturists. These resources may include a workbook and an enterprise budget worksheet template that can be used by prospective and active aquaculture producers.*

5. By 2013, IISG will collaborate with the Indiana Soybean Alliance and the Illinois Soybean Council to embark on a strategic planning process to increase the use of soybean products in aquaculture.

*IISG will develop aquaculture initiatives through a joint effort with the Indiana Soybean Alliance, the Illinois Soybean Council, Purdue University, and the State Aquaculture Association to solicit funding from the soybean checkoff, to embark upon a strategic planning process, and to increase soybean use in the aquaculture industry.*

6. By 2013, aquaculture producers in Illinois and Indiana will have access to established markets for three species (tilapia, hybrid striped bass, and largemouth bass) suited to production in the Midwest.

*IISG will conduct a study of live markets in Indiana and Illinois to evaluate wholesale fish and shellfish purchase practices of ethnic fish retailers to determine factors important to their purchases. Based on results from the study, IISG will partner with the aquaculture industry associations in Indiana and Illinois, Purdue University, and University of Illinois Extension to identify appropriate species and assist with the development of markets for those species.*

### **Research Needed to Solve Contemporary Problems**

1. Determine effective marketing strategies for aquaculture business strategies in Illinois and Indiana.
2. Develop methods and tools for improving aquaculture marketing in Indiana and Illinois.
3. Develop innovative fish and crustacean culture strategies of cool water species that improve human food production via biotechnology, culture system engineering, product development, and economics.

### **Fish Consumption**

The American Heart Association recommends we eat two servings of fish weekly because seafood offers many nutritional health benefits. But fish also may contain toxic chemicals such as PCBs and mercury. Research has shown that mercury, specifically, can be harmful to a developing fetus and a young child's developing nervous system.

Due to the presence of these chemicals, government agencies regularly issue advisories recommending that fish consumption be limited for certain species. The consumption advisories are generally written for the at-risk population of women who are pregnant, nursing, or may become pregnant, and young children.

Consumers need to understand the benefits of making fish a part of their healthy and balanced diet, while recognizing the potential health risks involved in consuming certain species of fish. The conflicting information creates a level of confusion among consumers who should be preparing and consuming fish for their health, as well as the health of their family. IISG has developed programs that reach out to underserved populations about the risks and benefits of fish consumption.

The outcomes of our fish consumption work are expected to be as follows:

- People living along the southern Lake Michigan coast will have a general understanding of the benefits and risks of eating fish.
- Fish consumers along southern Lake Michigan will support a sustainable and healthful seafood industry.

### **Outreach Objectives and Action Plans**

1. By 2010, IISG will conduct 15 community outreach programs to educate families—including underserved populations such as Hispanic, African American, and Korean—about the benefits and risks of consuming fish.

*Community outreach programs will be conducted to educate families (representing underserved populations including Hispanic, African*



American, and Korean) in Chicago, and Gary and Hammond, Indiana public schools, and through involvement with scouts, 4-H, and YMCA and through community health fairs and food festivals, about the benefits and risks of consuming fish.

2. By 2013, young people who eat locally caught fish will be educated on safe ways to enjoy or benefit from fishing along the Lake Michigan coast.

*Collaborative efforts between state and federal agencies and non-governmental organizations will result in educational materials specific to minorities in the region on the nutritional benefits and risks associated with eating fish.*

3. By 2013 educational information on the nutritional benefits and risks associated with eating fish will result in lowering mercury levels of health care professionals.

*IISG will partner with other nutritional extension programs in the Chicago region and northwest Indiana to develop educational programming materials that provide the necessary information promoting the benefits of eating fish and the associated risks. Participants will be asked to fill in surveys to assess their comprehension of the information that they received through the educational programming. IISG will also partner with Charles Santerre (Dept. of Foods and Nutrition, Purdue University) to do mercury analysis of hair samples, which will be another tool to determine the impact of the education programming.*

### **Research Needed to Solve Contemporary Problems**

1. Determine the social behaviors leading to acceptance and use of technical information on the safety of fish consumption.
2. Evaluate the impacts of fish consumption education programs.
3. Develop cost-effective and easy to use analytical techniques to evaluate personal exposure to contaminated fish.



*Courtesy of Duane Chapman*

## ***Sustainable Coastal Development***

Within the focus area of Sustainable Coastal Development, IISG has specialists who will work on issues related to land use planning and water supply. IISG has set the following general goals and strategies.

### **Goal: Environmentally and economically healthy communities along southern Lake Michigan.**

Strategy: Engage Chicago and the three lake counties in Indiana in comprehensive planning processes that lead to more economically and environmentally sustainable cities.

### **Goal: Lake Michigan communities live within their water supply budget.**

Strategy: Develop plans and inventories to enable communities along southern Lake Michigan to plan for water supply needs and assess the feasibility of future development.

Strategy: Support research to create better economic and market-based decision tools and evaluate the risks and benefits of renewable energy.

### **Goal: Communities along the southern Lake Michigan coastline balance economic and environmental conditions to optimize environmental sustainability.**

Strategy: Work with local agencies and researchers to develop model ordinances, regulatory standards, and economic incentives for land use development activities that can potentially mitigate the environmental impacts of land use decisions along southern Lake Michigan.

Strategy: Develop dynamic decision-support tools for coastal areas along southern Lake Michigan to inform local officials and other decision makers about the natural resource, economic, social, and cultural impacts of decisions.

Strategy: Assist communities along southern Lake Michigan with the adoption of smart growth, water supply planning, and other environmentally and economically beneficial strategies.

***We have written SMART objectives to help us reach these goals. They are by topic.***

### ***Land Use Planning***

Chicago's greater metropolitan region supports the economic, social, and recreational needs of 9.3 million people. Between now and 2030, projections suggest an additional two million people in this area. This population and economic growth will further stress the area's natural and ecological resources, especially the quality and quantity of its land, water, air, plant, and animal resources. New plans and policies, novel institutional arrangements, and innovative regulatory and market-based management strategies are needed to accommodate this growth while protecting – and possibly even enhancing – the region's ecological services and biodiversity.

IISG will develop and promote the use of decision-support systems, work with local officials, and assist regional planners in formulating new development and resource management strategies that maximize cost-effectiveness and address multiple



objectives. IISG's computer models and program outreach efforts to local officials charged with managing land use and development will ensure more sustainable growth at the community scale. IISG planning assistance to regional agencies will help them sustainably manage surface and groundwater resources (and their associated ecosystems) at the appropriate watershed and aquifer scales.

The outcomes we expect to see as a result of this work include:

- Community leaders will use the decision-support tool to make economically and environmentally responsible decisions.
- Communities will weigh the impacts and benefits of various development strategies.
- Communities will plan based on the available water supply and ecological tipping points of Lake Michigan.
- Decision tools will inform communities about hydrologic and water quality impacts of land use decisions.
- Communities will adopt smart growth principles.
- Communities along southern Lake Michigan will incorporate natural resource management strategies into comprehensive land use planning and implementation efforts.
- Green infrastructure initiatives will become integrated into planning efforts in the region.
- Economic incentives will encourage southern Lake Michigan communities to use available water supplies and natural resources more efficiently.
- Communities along southern Lake Michigan will have the tools to evaluate renewable energy choices.
- Ordinances and regulatory standards will help mitigate climate change along southern Lake Michigan.

### ***Outreach Objectives and Action Plans***

1. By 2010, IISG will assist in the development and application of a dynamic decision-support model for the coastal area of northeastern Illinois to inform local officials and other decision makers of the hydrologic and water quality impacts of their land use decisions.

*IISG will continue to work with the Lake Michigan Ecosystem Partnership and the Alliance for the Great Lakes to help develop and disseminate a dynamic decision-support model for the Great Lakes basin in northeastern Illinois that addresses both land use and hydrologic projections within the coastal area. This model, which will integrate the Land Use Evolution and Impact Assessment Model developed by the University of Illinois and the Long-Term Hydrologic Impact Assessment Model developed by Purdue University, is being developed under a grant to University of Illinois by the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET).*

2. By 2010, state and regional comprehensive stormwater management, and ecological restoration plans, programs, and initiatives will incorporate “green infrastructure.”

*IISG will participate in regional planning activities facilitated by the Chicago Metropolitan Agency for Planning (CMAP); will participate on the Sustainability Team as part of the Chicago Wilderness Consortium; and will provide input into the CMAP 2040 Plan.*

3. By 2012, The Planning with POWER Project will assist eight communities and counties in northwest Indiana with adoption of smart growth principles to protect natural resources and water quality.

*IISG will work with communities so that ordinances include conservation design development, traditional neighborhood compact development, transit oriented design, other compact, mixed use, walkable developments, open space planning and preservation, and/or riparian buffer ordinances along water bodies.*

4. By 2014, IISG will contribute to improved planning efforts and management of critical ecological resources in the Chicago metropolitan area.

*IISG will continue to serve as a member of the City of Chicago Government Working Group and will work with the City of Chicago to implement the Calumet Ecological Management Plan and the Calumet Stewardship Initiative. The ecologically-based planning expertise provided by IISG will help achieve a sustainable balance between environmental and economic objectives.*

5. By 2010, eight Indiana counties (encompassing 2,987 square miles) will use IISG’s Planning with POWER project to recognize and incorporate natural resources management, green infrastructure, and impervious surface strategies and actions in their comprehensive land use planning and implementation efforts.

*IISG will provide Planning with POWER presentations to county planning officials, watershed management planners, and interested stakeholders in counties throughout Indiana. Counties interested in incorporating natural resource-based planning into comprehensive plans will receive ongoing technical and facilitation support. Counties seeking to make substantial changes to zoning ordinances and comprehensive plans will be encouraged to empower a local workgroup to undertake this task. Planning with POWER will work closely with these workgroups as they incorporate science-based management practices and principles into local policy.*

6. By 2011, three counties will use the online, GIS-based inventory and assessment tool as part of their sustainable development planning efforts.

*A team from Purdue University and IISG completed a needs assessment of community planners, planning consultants, public officials, and community development extension professionals to find ways to improve the development and implementation of*

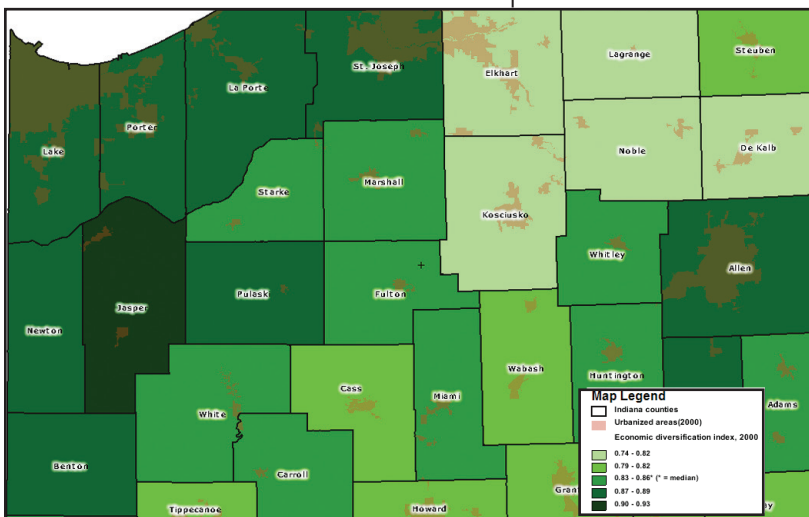




sustainable comprehensive plans. Five key results were found with respect to inventory and analysis activity in the planning process. First, rural counties spend most of their limited funds conducting an inventory assessment, leaving very little for visioning and identifying a meaningful strategy for future sustainable development. Second, the inventory part of the planning process needs to be expanded in accordance with sustainable development principles supported by research. Third, significant efficiencies could be realized if inventory data were collected and made available in a central location for use by communities and consultants. Fourth, support materials are needed to assist communities and consultants in understanding the importance of inventories and how to interpret the inventory databases. Fifth, an easy, online user interface must be part of a consolidated inventory database so professionals and residents can access, discuss, and incorporate their efforts directly into planning documents.

Given these results, we propose to develop an online inventory identification and assessment tool to facilitate the completion of

phase one of the comprehensive planning process by communities. We will conduct a literature review of the primary components of an inventory and an assessment as well as primary indicator variables for summarizing an inventor. We will identify suitable inventory variables from the literature survey for inventory assessments, collect statewide data sets of identified inventory variables and supporting documentation, and design and implement a GIS online interface for use by communities in conducting an inventory and analysis of existing conditions. We will develop additional GIS tools to allow the downloading of maps and data for inclusion in committee reports and comprehensive planning documents, and promote use of this inventory and



assessment tool through news releases, presentations, training workshops, and pilot testing in participating counties.

The activities provide the basis for measuring progress in terms of IISG activities, outputs, and finally outcomes. Initially, we will track identification of inventory variables, data collection, and development of the tool. Once the inventory tool is developed, we will follow up on workshops, presentations, website activity, and interactions with participating counties to document changes in behavior, including integration of the inventory analysis into new and ongoing planning efforts.

- By 2012, IISG and partners will develop an online, GIS-based multiple objective decision model. Three counties will use this model as part of their sustainable development planning efforts.

Many comprehensive planning efforts are not completed or are scaled back because communities find themselves considering dozens of indicator variables with little or no assistance in how to use them in comparing future sustainable development strategies. Communities

need a decision model that assists them in: identifying their economic, ecologic, social, and cultural objectives: matching key indicator variables to these objectives: and then providing a decision rule to compare strategies through the weighting and aggregating of the indicators variables.

As part of this program, we will develop a multiple objective decision-analysis model for use in the planning process. We will: research past uses of multiple-objective decision analysis in comprehensive planning; create a suitable hierarchical decision framework that incorporates the economic, natural resource, social and cultural objectives associated with sustainable development; link suitable indicator variables to the decision model; adopt a decision rule; and incorporate the model into our online decision system for use by communities. To promote use of the decision model, we will write news releases, make presentations, and conduct workshops.

The activities provide the basis for measuring progress. IISG activities leading up to the availability of the online decision tool will be tracked. We will follow up on interactions with communities (workshops, presentations, reports, website activity) and finally use by pilot communities as part of their ongoing planning efforts.

8. By 2013, three communities will use an online, GIS-based comprehensive decision-support system to write plans that promote sustainable economic growth and natural resource protection.

The standard comprehensive planning process and variants of it that incorporate sustainable development and other approaches are described in dozens of books, journal articles, manuals, and websites. Though useful, planning professionals and planning groups really need a place they can go that integrates sustainable development principles, supporting data, and a decision model within the standard planning process.

This objective supports the development of an online comprehensive decision-support system where communities can access and use the best available data, tools, and models for writing and implementing plans that promote economically viable, ecologically sustainable, and socially-equitable development plans. This “one-stop” decision-support system will be built using data, models, and tools readily available from other projects and sites. The standard comprehensive planning process will be used to establish work flow and incorporate data, models, and tools into the online system. Where gaps exist, new data, models, and tools will be developed. News releases, presentations, training workshops, and pilot testing in participating counties will be used to promote and improve the decision system.



*The use of the decision-support system by the pilot counties and others provide the basis for measuring progress. IISG activities leading up to the availability of the online decision support system will be documented, as well as interactions with communities (workshops, presentations, reports, website activity) and use by pilot communities as part of their ongoing planning efforts.*

### **Research Needed to Solve Contemporary Problems**

1. Identify land use indicators and tipping points that threaten Great Lakes ecosystems and footprints needed to sustain these ecosystems.
2. Create better economic and market research-based decision tools.
3. Evaluate the risk and benefit of renewable energy technologies.
4. Develop better ordinances and regulatory standards for land use development activities that can potentially mitigate the impacts of climate change. This may include:
  - more effective on-site storm water management requirements,
  - green roofs and landscaping that can mitigate urban heat island effects,
  - programs and codes that promote energy and resource conservation,
  - life-cycle costs and construction materials that are carbon neutral in terms of the development or redevelopment of coastal communities.
5. Develop innovative economic incentives that can be employed to facilitate sustainable development objectives and evaluate their effectiveness against command-and-control strategies. (In many cases, the optimal public policies promoting sustainable growth are likely to be a combination of economic and regulatory initiatives.) Research should assess what such a mix should include under various spatial, ecological, and economic development conditions.

### **Water Supply**

Even where water appears plentiful, such as the southern Lake Michigan region, planning ahead is necessary to ensure adequate and reliable supplies of clean water for all users at a reasonable cost into the future. Regional water supply planning includes an increase in communication, coordination, and decision making among all entities served by each major aquifer and watershed. It is an attempt to bring a shared responsibility to Illinois and Indiana for the long-term sustainability of water supplies.

Improved water supply planning can reduce conflicts, increase preparedness for droughts and possible climate change impacts, lead to joint considerations of surface waters and groundwater, increase the level of awareness of water as a commodity, and increase the level of cooperation among analysts and decision makers. Meeting the goal of providing adequate supplies of clean water at a reasonable cost will enhance economic development, environmental protection, and public health.

We expect our work in water supply to result in the following outcomes.

- Economic incentives encourage southern Lake Michigan communities to use available water supplies and natural resources more efficiently.

- Communities will plan based on the available water supply and ecological tipping points of the Lake Michigan.

### **Outreach Objectives and Action Plans**

1. By 2009, the regional planning commission in northeastern Illinois will develop a water supply plan for the region that is consistent with their policy framework and water budgets.

*IISG will work with the Chicago Metropolitan Agency for Planning to write, facilitate, and produce the water supply plan required under the Governor's Executive Order 2006-01.*

2. By 2013, northeastern Illinois will implement a sustainable water supply plan that considers recommended water conservation measures.

*IISG will work with the Chicago Metropolitan Agency for Planning in conducting economic analyses supporting implementation of the 2009 plan recommendations. Using the implementation experience gained by 2013, which will be four years into the next regional water supply planning cycle, IISG will contribute to the development of the second regional water supply plan to be completed by 2014.*

### **Research Needed to Solve Contemporary Problems**

1. Investigate water conservation strategies and incentive-based approaches to water supply planning and implementation.
2. Develop clear and easy to use planning guidelines for local officials to reasonably consider appropriate water supply policies for their communities.



## ***Hazard Resilient Coastal Communities***

Within the Hazard Resilient Coastal Communities focus area, IISG will direct some resources to address climate change concerns in the southern Lake Michigan basin. We have set the following goal and strategy for our work in this area.

**Goal: Broader awareness and understanding of climate change in the southern Lake Michigan region.**

Strategy: Design educational opportunities to enable residents in the southern Lake Michigan region to understand the causes and impacts of climate change.

***We have written SMART objectives to help us reach these goals. They are by topic.***

### ***Climate Change***

Climate change projections for the Great Lakes region of the United States are beginning to raise a number of concerns at the local and state levels. Regional climate change projections call for rising annual average temperatures, leading to more frequent and severe storms and greater stormwater runoff in summer, and less snow and ice cover due to shorter, warmer winters. Such projected changes in precipitation, evaporation and groundwater recharge rates have significant implications for the state's shipping and port facilities, municipal sewer and stormwater systems, and drinking water supplies, as well as potentially huge consequences for its agriculture and tourism industries.

We expect our work on climate change to have the following outcome:

- Climate concepts will be understood by residents along the southern Lake Michigan coastline.

### ***Outreach Object and Action Plan***

1. By 2014, at least 120 residents in the southern Lake Michigan region will have knowledge available to them to understand the impacts of climate change.

*IISG will develop tools for residents so that they will be able to prepare better for, and respond to, climate change impacts. Also, people and communities in the Great Lakes basin will be able to plan and adopt practices that mitigate climate change impacts.*

2. By 2013, 70 individuals in the Calumet region will attend a class to become more aware of climate change.

*A new undergraduate/graduate class titled Climate Change and the Environment will be introduced in the fall of 2009 at Purdue University Calumet. The class will introduce students to the newest information currently available on climate change with emphasis on the aquatic environment.*

