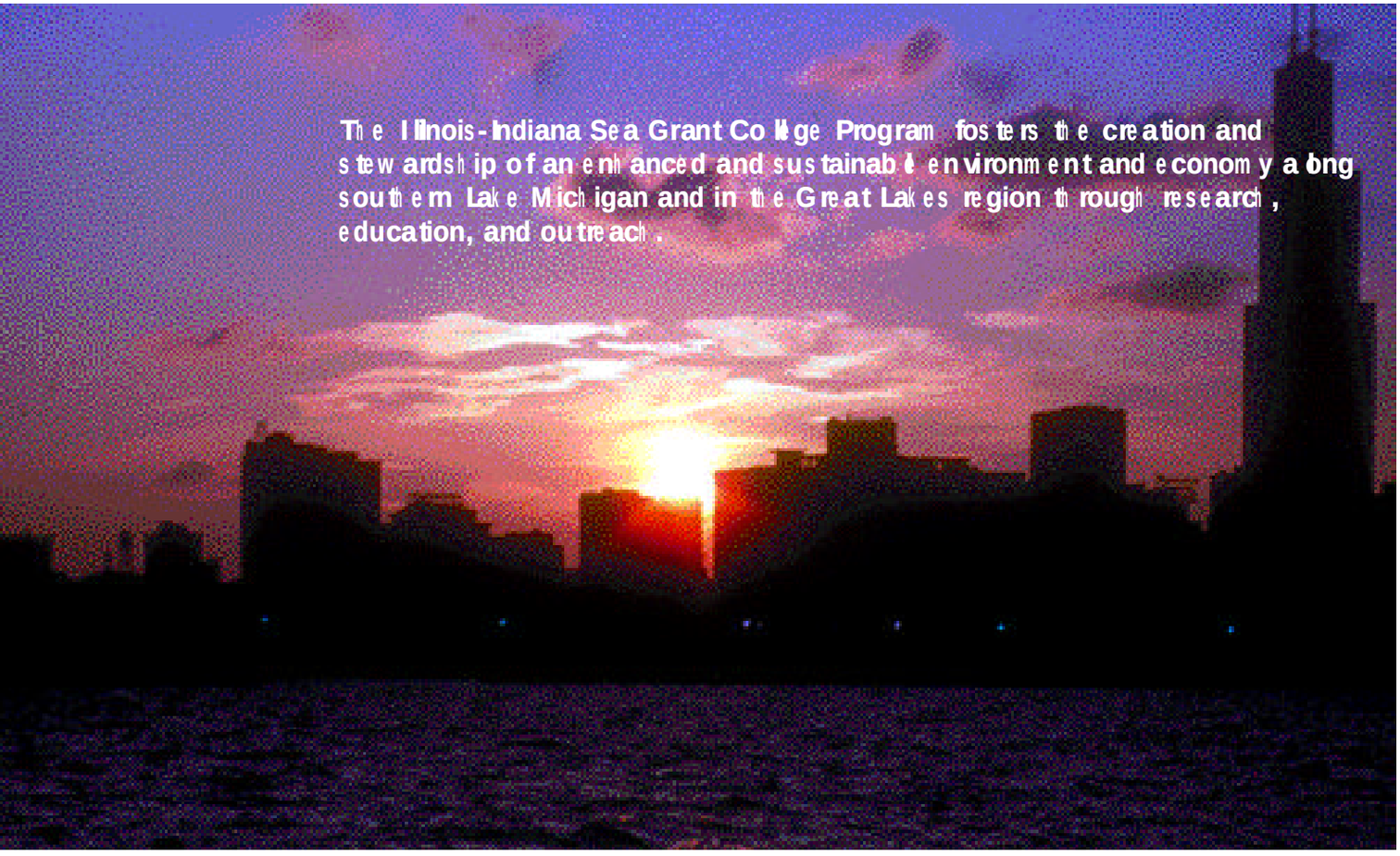
Strategic Plan

2001-2005



Illinois-Indiana
Sea Grant College Program

Sea Grant
ILLINOIS-INDIANA

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FUNCTIONAL AREAS

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Introduction

The Illinois-Indiana Sea Grant College Program is one of 29 programs constituting the National Sea Grant network. The National Program is dedicated to an approach utilizing research, education and outreach to promote the wise use of our nation's coastal, ocean, and Great Lakes resources for a sustainable economy and environment.

The vision of the Illinois-Indiana Sea Grant College Program is to become a premier provider of new information and unbiased science-based outreach and education on coastal issues in southern Lake Michigan.

The Illinois-Indiana Sea Grant College Program serves clients along 104 miles of heavily urbanized and industrialized shoreline in Illinois and Indiana. One third of the population of the Great Lakes resides along the shore of Lake Michigan, between Milwaukee, Wisconsin and Michigan City, Indiana which is the largest population center outside of New York City and Los Angeles.

The Program is jointly sponsored by Purdue University, West Lafayette campus and the University of Illinois at Urbana-Champaign. The Program promotes and embraces partnerships with universities throughout the bi-state area.

To reach our goals, the Program serves:

- Resource Users – including coastal residents, coastal businesses and industries, lake food consumers, tourists, and anglers
- Policy Makers – including government and municipal officials at all levels
- Information Users – including natural resource professionals, environmental organizations, industry managers, media, citizen groups, aquaculture producers, educators, and university researchers

Over the next five years, the Illinois-Indiana Sea Grant College Program will address local and regional needs and opportunities in accordance with the priorities of the National Sea Grant College Program in four areas:

- Seafood Production
- Coastal Economic Development
- Coastal Ecosystem Health
- Education and Human Resources

This strategic plan describing our goals and objectives for 2001-2005 is the product of the Illinois-Indiana Sea Grant College Program staff who represent a diverse clientele including government and non-government agencies and organizations, private citizen groups, and educational units. The overall direction and focus of the primary components of the plan are formulated from input from a wide-range of stakeholders in the bi-state region and tempered by existing priorities and activities of government and non-governmental organizations that impact the southern Lake Michigan region. The strategic plan is a reflection of the views and inputs of the research community in Illinois and Indiana and is endorsed by the Research Advisory Committee for the Program. The Research Advisory Committee (RAC), composed of senior level scientists and research administrators, representing prominent research universities in Illinois and Indiana makes recommendations on research priorities and funding levels, reviews the request for proposals (RFP) issued by IISG, and provides technical expertise, as

needed, in the review of pre-proposals and unsolicited proposals received by the Program. Finally, the strategic plan has the consensus approval of the External Users Advisory Committee and the Joint University of Illinois, Purdue University Policy Advisory Committee (JUPC). The External Users Advisory Committee (EUAC), composed of state and federal agency personnel, as well as university and business leaders in the bi-state region, provides recommendations to IISG concerning user needs and the activities required to meet them. The EUAC reviews and recommends research projects for their relevance to the user community.

The Joint University of Illinois, Purdue University Policy Advisory Committee for the Illinois-Indiana Sea Grant College Program is composed of senior research officers and Deans at the University of Illinois, Urbana-Champaign and Purdue University, West Lafayette campuses. Chancellors and Vice-Chancellors of relevant campuses in the University of Illinois and Purdue University systems are also members. The JUPC provides oversight for all policy and budget decisions in the Illinois-Indiana Sea Grant College Program.

The Implementation Plan of the 2001-2005 Strategic Plan is described in a companion document. The Implementation Plan provides details of the specific activities required to achieve the thematic/functional area goals and objectives outlined in this document.

The environmental and economic resources associated with southern Lake Michigan are important to its residents and the local and national economies for the following reasons:

- One national lakeshore, two state parks, two local parks, and 25 preserves, natural, environmental or wilderness areas are located along the southern Lake Michigan shoreline.
- 40 % of the nation's steel is produced along this shoreline.
- 7 million people live within 7 miles of the coast.
- 10 million people get their drinking water from southern Lake Michigan.
- Ships from 64 countries, accounting for 4% of the nation's imports/exports, pass through southern Lake Michigan harbors.
- Approximately 1.6 million residents use beaches and marinas and participate in recreational fishing along the southern Lake Michigan coastline.
- Nonindigenous aquatic nuisance species introduced to Lake Michigan and ultimately to inland waters cost residents and industry $13.8 million in 1997 for control measures.
- An estimated 400,000 recreational boats are operated on Lake Michigan each year and anglers spend approximately $454 million annually on trips and related equipment. Much of the boating activity is tied to marina development. 1,000 new slips were added annually on the southern shore of Lake Michigan in the late 1980s and early 1990s.
- The Chicago seafood market is the fifth largest in the U.S. and imports 99% of the product consumed in the Midwest.
- The aquaculture industry in Illinois and Indiana exceeds $7 million in sales annually and has averaged a 10% annual growth since 1991.
- Coastal industries provide approximately 20,000 jobs and $1 billion annually in personal income to the metropolitan regional economy.
- Coastal recreational activities such as marinas, charter fishing and gambling boats provide approximately 15,000 jobs annually and contribute $780 million in personal income to the metropolitan regional economy.
- Illinois and Indiana waters contain 4,800 acres of shallow water habitat essential for production and maintenance of waterfowl populations and as spawning grounds for many of Lake Michigan's 40 fish species.
- 43% of all Great Lakes fishing, with an economic value of $11 million annually, occurs in Lake Michigan.

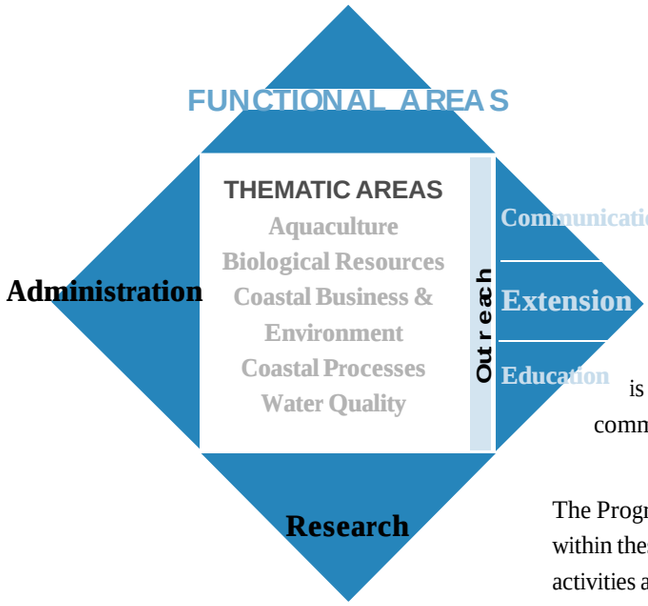
Mission

The mission of the Illinois-Indiana Sea Grant College Program is to foster the creation and stewardship of an enhanced and sustainable environment and economy along southern Lake Michigan and in the Great Lakes region through research, education, and outreach.

In the urbanized and industrialized southern Lake Michigan region, a number of topics require attention. The Illinois-Indiana Sea Grant College Program focuses its resources on high-priority local topics which also address priorities outlined in the National Sea Grant College Program's Strategic Plan, thereby maximizing the Program's impact.

Five broad thematic areas/topics are the focus of this strategic plan: 1) aquaculture and seafood safety, 2) biological resources, 3) coastal business and environment, 4) coastal processes, and 5) water quality. The coastal processes thematic area, while identified as a priority topic, is in the nascent stage. As additional program funding becomes available, resources will be dedicated to developing this area into a larger scale effort. The Program currently has active research and outreach projects in the other four topic areas.

Organization

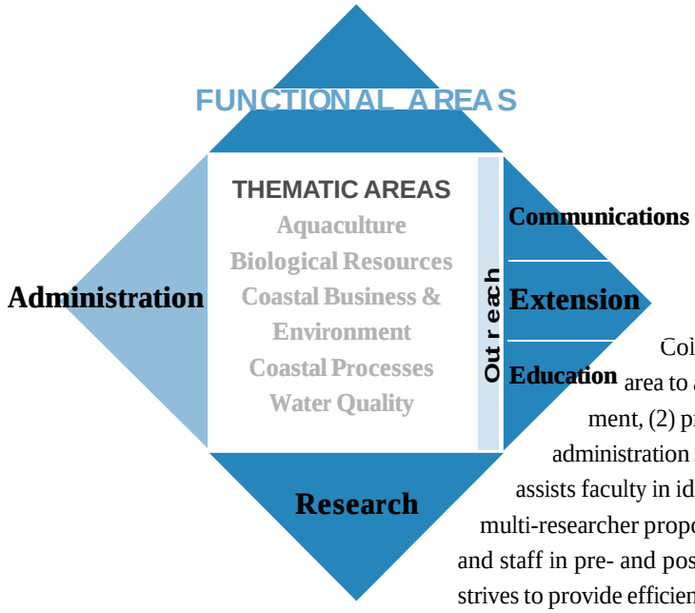


Our activities are organized via three overarching functional areas: administration, research and outreach. Further, outreach is composed of three functional units – extension, education, and communications.

The Program's thematic areas identify the subject area priorities and it is within these broad categories that specific research topics and outreach activities are identified, organized, and integrated. Thematic area and subject matter priorities for the IISG are identified by the Program's Research and External Users Advisory Committees, research scientists, and outreach specialist who work with clientele with wide ranging interests. The administration also seeks input from government and non-government agencies and organizations in the bi-state and Great Lakes regions.

The research and outreach functional areas are complementary for each thematic area of the Program. The administration facilitates the activities of the research and outreach functional components and provides the support and leadership in developing opportunities to expand the scope of the Program.

While the functional areas of IISG are largely defined by the mission of the National Sea Grant College Program, its specific organizational arrangement and the location of its offices and staff are strongly influenced by the host institutions – the University of Illinois and Purdue University. IISG administration interacts with the supporting units of both universities, as well as the upper administrations to ensure continuing financial and logistical support for the Sea Grant Program.



Administration

In support of its mission, the Illinois-Indiana Sea Grant College Program has organized its administrative functional area to address three principle activities – (1) program development, (2) program management, and (3) research coordination. The administration strives to facilitate creative research and scholarly activities, assists faculty in identifying potential funding sources, assists in organizing multi-researcher proposals, and promotes graduate education. In assisting faculty and staff in pre- and post-award management of their grants, the administration strives to provide efficient and timely service in the least bureaucratic manner possible. The administration promotes Sea Grant's mission of research, education, and public service, as well as the creation, dissemination and transfer of research results to the public in a meaningful way.

Uniformally applied policies, within organizational limits, and sound strategic planning are utilized to further the Program's mission, goals, and program scope. An organizational culture exists which fosters information and resource sharing, creativity, and collaboration amongst the staff and project partners. A proactive and effective administration is essential in streamlining office and bureaucratic procedures, increasing program visibility, and increasing overall program funding.

The administration promotes the concept of multi-state/regional research and outreach activities and aggressively supports such efforts. Partnerships are key ingredients in the continuing growth and success of the IISG Program. The administration actively seeks collaboration and forms partnerships with universities, other Sea Grant Programs, state and federal governmental agencies and laboratories, not-for-profit non-governmental agencies, city and municipal governments, and citizen groups to address the resource and information needs of the southern Lake Michigan region. This multi-institutional, inter-disciplinary approach is efficient and effective in addressing complex issues and provides real ownership to all partnering units. The IISG strives to be a value-added enterprise, being careful not to duplicate efforts and activities already provided by other organizations in the area.

Through its networks, the administration strives to stay abreast of current and future research/outreach needs as well as current and planned projects and activities. While the critical linkage of research and outreach is a common characteristic of Sea Grant Programs, the value-added aspect of IISG is not common to many other programs in Illinois and Indiana.

Goals

- Increase overall Program efficacy, scope, funding and visibility through collaborative research, extension, education, and communications efforts.
- Recruit and retain productive staff who are empowered to use their creativity, imagination, and energy.

Program Development Objectives

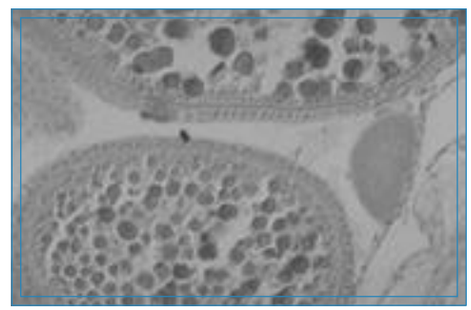
1. Initiate projects proposed during the grant period and solicit projects in areas of high program priority.
2. Augment existing functional and thematic area projects in cases of special need or emergency.
3. Initiate new thematic area projects as needed/appropriate.
4. Create and promote fellowship opportunities.

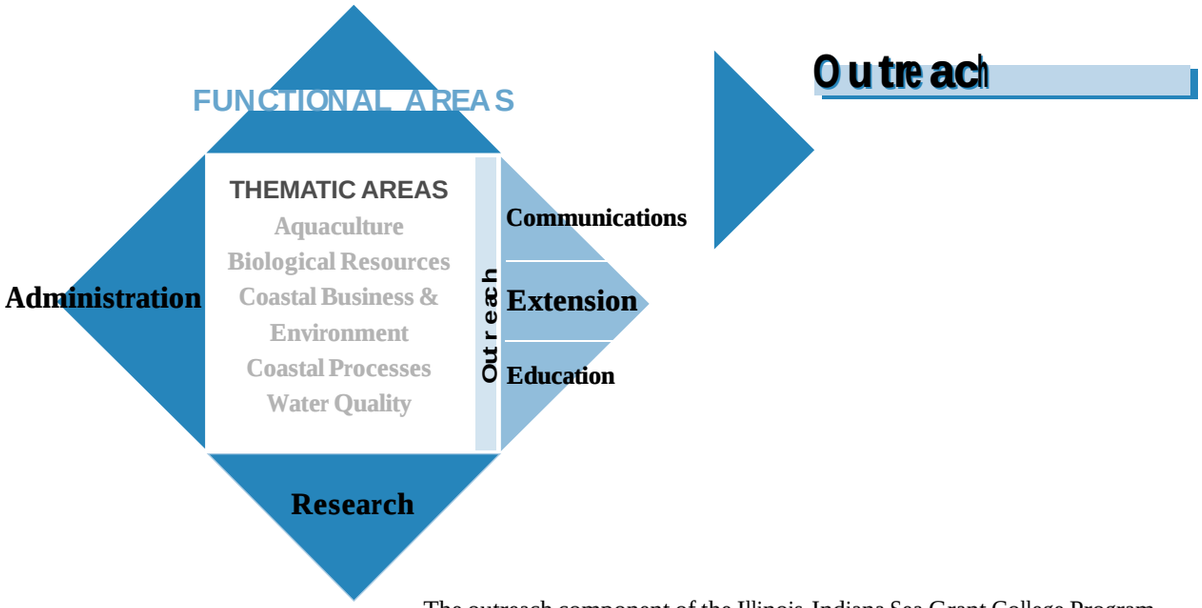
Program Management Objectives

1. Provide leadership for and manage the Illinois-Indiana Sea Grant Program.
2. Maintain public awareness of the Illinois-Indiana Sea Grant Program and its benefits
3. Coordinate Illinois-Indiana Sea Grant Program activities with other university, state, federal, and private Great Lakes research and education programs.
4. Obtain other sources of funding for the Program.
5. Maintain productive relationships with the National Sea Grant College Program, National Oceanic and Atmospheric Administration, and the Sea Grant Association.
6. Maintain productive relationships with researchers in the bi-state area.
7. Continue self-evaluation process and strategic planning for future.
8. Forge stronger relationships with Illinois and Indiana industries, businesses, researchers, institutional and university administrators, and all user populations.

Research Coordination Objectives

1. Organize and hold grant preparation/information seminars for current and potential researchers in the bi-state area.
2. Utilize new, developing technology to support current and potential research activities.
3. Foster collaborative research partnerships.
4. Provide accurate and timely information to the broadest audience.
5. Assist PI's in pre- and post-award management.
6. Facilitate processing of proposals by streamlining process through automation.





The outreach component of the Illinois-Indiana Sea Grant College Program provides a vital link between researchers and information users. This link empowers university researchers, policy makers, resource users, and environmental professionals to take full advantage of the findings from research to operate more profitably, effectively, and compatibly within the Lake Michigan ecosystem. Outreach is accomplished by subject matter specialists working with communications specialists to assemble the expertise and knowledge needed by client groups and to package the information into a useable form. Subject matter specialists provide technical information, training, and continuing education for natural resource professionals, community leaders, resource users, aquaculture producers, and interested citizens through many avenues (e.g., workshops, publications, one-on-one assistance, electronic technologies, and hands-on demonstration projects).

Thematic area goals are common for both research and extension. Extension objectives have been listed by each thematic area throughout the strategic plan. Our education and communications goals and objectives, which span the five thematic areas, are described in this section.

Outreach

Communications

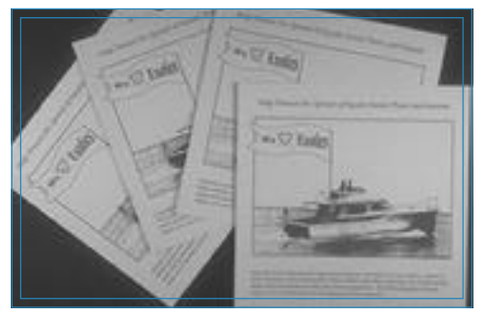
The communications staff provides expertise and logistical support to researchers and specialists in public information, product development and distribution, marketing, and product evaluation. These communications specialists help researchers and extension personnel match the medium with each message being conveyed to particular Sea Grant audiences. Through the use of existing, new and emerging electronic technologies, Sea Grant serves clientele with up-to-date information and offers immediate access to Sea Grant's research and outreach. This approach offers a responsive service to information seekers, reaching beyond the borders of Illinois and Indiana to extend IISG's information to a worldwide community.

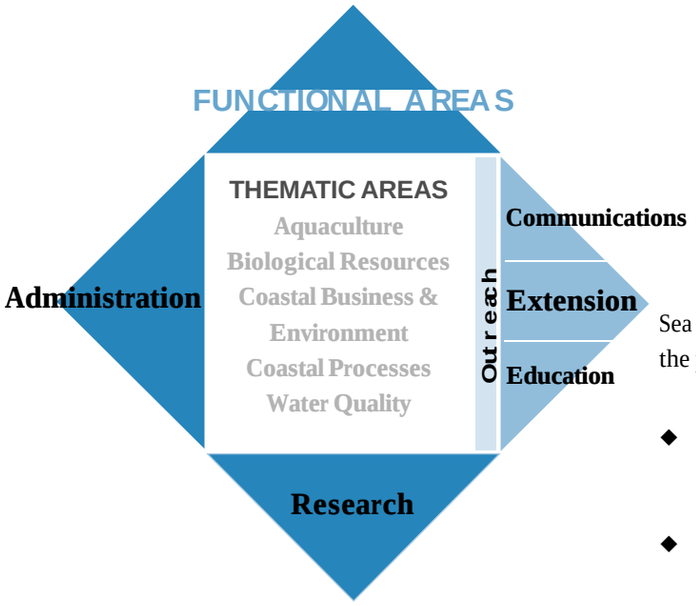
Goals

- Increase client accessibility to Sea Grant information and products.
- Increase program visibility.

Objectives

1. Identify and utilize the means of communication that maximizes use of information developed by Illinois-Indiana's research and outreach staff members.
2. Determine appropriate client groups (general public information vs. targeted audiences), design appropriate messages and deliver them through print, broadcast and electronic media to increase accessibility to information and to inform citizens of the southern Lake Michigan region about issues of concern that relate to Illinois-Indiana Sea Grant's five thematic areas.
3. Identify new clientele that can benefit from Sea Grant research and outreach information.
4. Use effective marketing techniques to provide opportunities for people to enhance their quality of life and learn the most effective ways to interact with the ecosystem in a sustainable manner.
5. Provide technical support and expertise that will enable researchers and outreach personnel to deliver their findings to clients through effective products and an efficient, easily accessible product distribution system.





Sea Grant's education programming is directly linked to the primary goals of the K-12 educational system:

- Preparing future scientists and engineers for further study in college and graduate school
- Creating a foundation for those who will enter the workforce in other capacities
- Providing scientific and technical understanding to enable children to become adults capable of making informed decisions as consumers and as citizens.

Illinois-Indiana Sea Grant's education programming adheres to the recommendation made by the U.S. House Committee on Science in its September 24, 1998 Report to Congress:

> *Curricula must be developed and implemented for all elementary and secondary years that are rigorous in content, emphasize the mastery of fundamental scientific and mathematical concepts as well as the modes of scientific inquiry, and encourage the natural curiosity of children by conveying the excitement of science and math.*

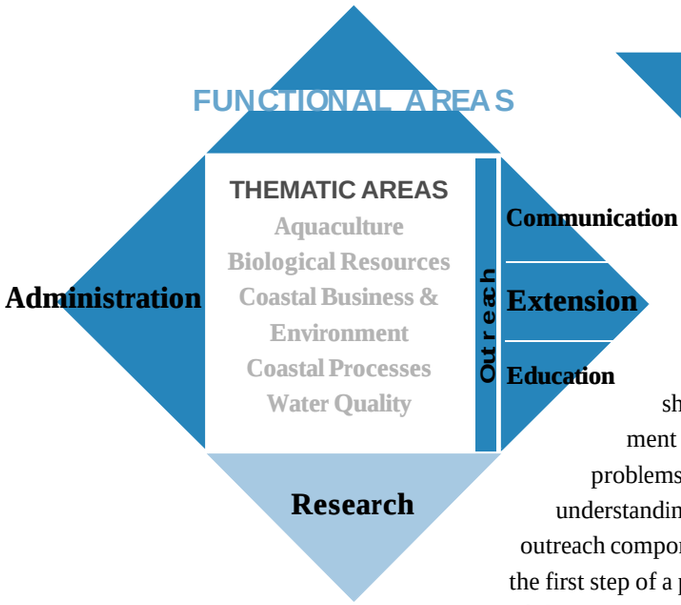
The education component of the Illinois-Indiana Sea Grant College program is composed of projects, and partnerships with education leaders in Illinois and Indiana to develop resources to support the National Sea Grant College Program's education initiatives. Such resources provide continuing education opportunities, training packages and classroom support materials for teachers of grades K-12 on topics in water quality, aquaculture, and biological resources.

Goal

- Develop programming for K- 12 education that is multi-disciplinary and that provides students with a basic understanding of and appreciation for: Lake Michigan water quality, environmental resources, and applications of aquaculture.

Objectives

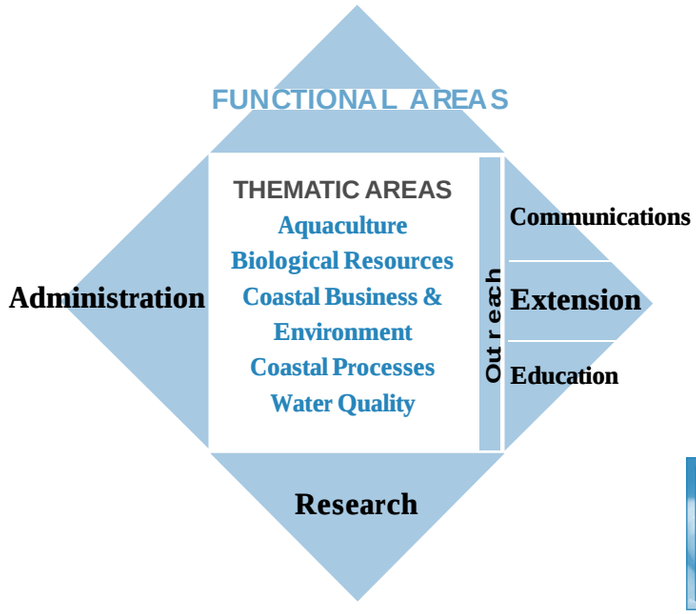
1. Develop training opportunities, classroom materials, and web-based resources that enable teachers to deliver education in the classroom and in informal learning environments on water quality, biological resources, and aquaculture issues.
2. Develop resources and provide training to teachers to encourage science writing in secondary schools to create a more scientifically-literate public.
3. Develop and maintain partnerships with prominent educational institutions across the nation (museums, zoos and environmental education centers) to expand the delivery of Sea Grant's education products to elementary and secondary schools and to improve knowledge of aquatic issues.
4. Offer clientele low-cost opportunities for learning through distance education technologies.



Research

Through the understanding of basic relationships and processes, research leads to the development of new technologies capable of solving the problems confronting society. The new knowledge and understanding derived from research is the engine driving the outreach component of the Program. Research also provides the first step of a process that ultimately leads to the attainment of the Program's goals. Project proposals are selected through a solicitation and peer review process and researchers are encouraged to keep in mind the transference of user information and products when they design and conduct projects. Input from Sea Grant outreach personnel and external users provides guidance to each researcher about area and user needs, in addition to methods for transferring the knowledge. All research objectives are listed by thematic area throughout the document.

The Illinois-Indiana Sea Grant College Program actively supports research projects that provide the opportunity for graduate student education and training. Graduate education leads to the creation of an infrastructure of professionals who are critical in the advancement of science and technology. In addition, the program provides opportunities for concurrent and postgraduate internships and fellowships in many forms.


FUNCTIONAL AREAS
THEMATIC AREAS
Aquaculture
Biological Resources
Coastal Business & Environment
Coastal Processes
Water Quality
Administration
Outreach
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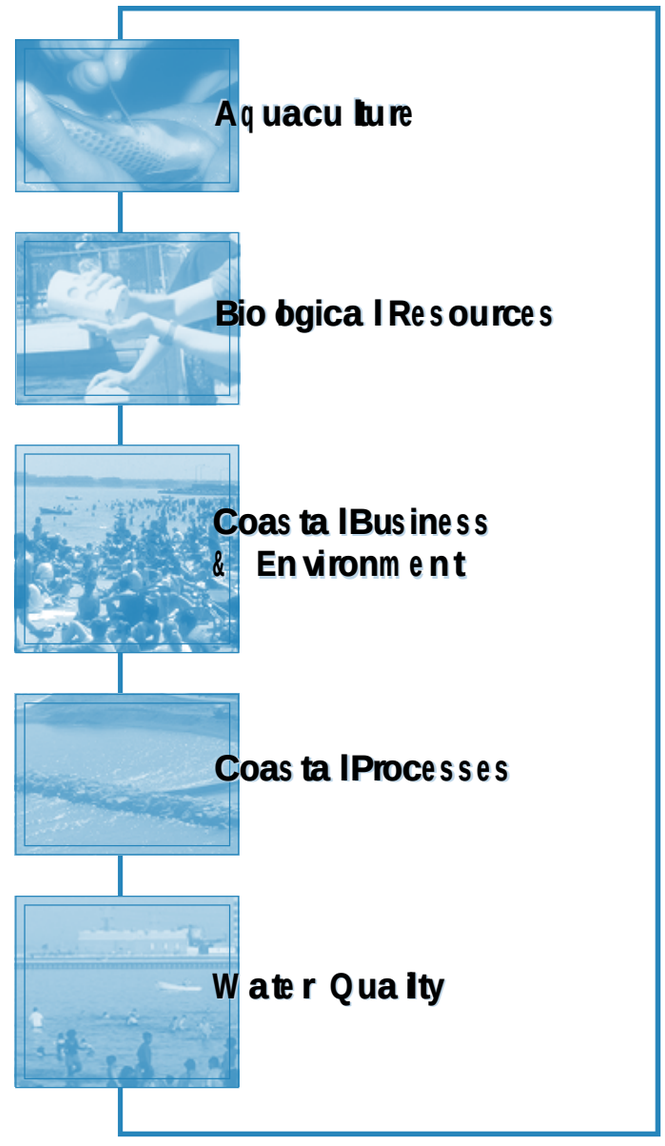
Extension
Education
Research


Aquaculture
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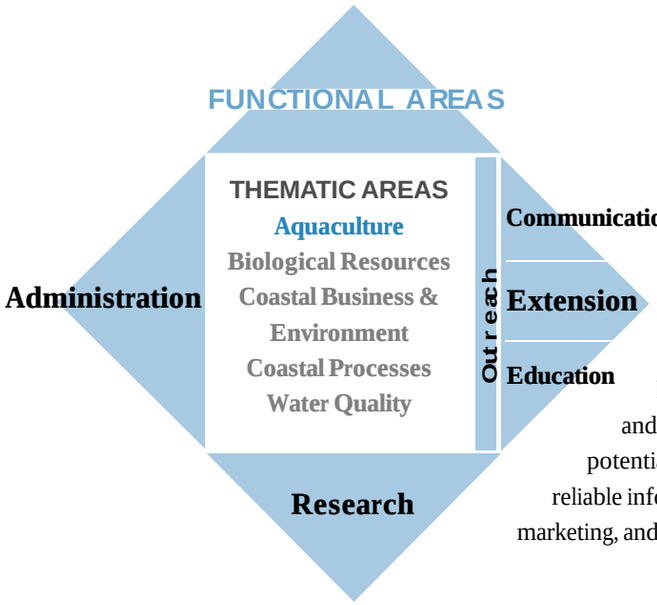
Aquaculture



Aquaculture is one of the fastest growing areas of U.S. agriculture and the rapid growth has attracted the attention of potential producers and investors. In a successful aquaculture enterprise, potential producers must have access to timely and reliable information on a wide variety of economic, marketing, and technical topics.

Currently, less than one percent of the farm-raised seafood consumed in the U.S. is produced in the Midwest. Indications are that midwestern aquaculture will continue to grow because: 1) per capita consumption of farm-raised products is increasing, 2) the Midwest provides a ready supply of raw materials for low cost fish feed (corn and soybeans), 3) the Midwest supports a large consumer base (i.e., one-half of the U. S. population lives within one day's drive of the two states; and Chicago, for example, is one of the five largest U. S. seafood markets), and 4) the Midwest has a large number of potential producers who are receptive to incorporating aquaculture into their existing farming operations.

The aquaculture industries in Illinois and Indiana consist of farm operations and allied support services. Most of the 150 licensed operations produce sport fish and bait fish, with an increasing number of food fish producers. Past survey results indicate that the combined gate receipts for the aquaculture industries in Illinois and Indiana contribute over $7 million dollars per year from the sale of more than 20 species of fish, crustaceans, and aquatic plants.

The benefits of an expanded aquaculture industry in Illinois and Indiana are enormous. Aquaculture will improve the struggling economies in rural and urban counties. Farmers look to aquaculture as a means of economic stability through farm diversification. Food safety and quality are expected to improve through increased consumption of farm-raised products. Finally, commercial fishing pressure will be reduced through the substitution of farm-raised species, historically caught from the Great Lakes region.

Goal

- Increase the size and profitability of aquaculture industries in Illinois and Indiana.

Research Objectives

1. Develop innovative aquaculture (fish and crustacean culture) strategies of cool water species that complement the fishery management needs for human food production via biotechnology, understanding specific nutritional requirements, culture system engineering, product development and economics.

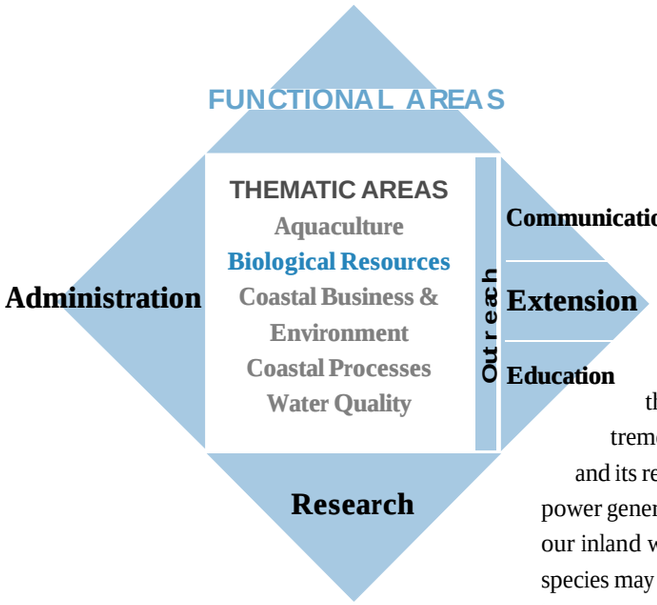
2. Increase the safety and quality of "seafood" produced, processed and consumed in the United States.

3. Conduct basic research to improve the nutritional and reproduction efficiencies of cool water species.

4. Conduct applied research to determine the technical and economic feasibility of double cropping warm, cool, and cold water species.

Extension Objectives

1. Convey the profitability of aquaculture to potential farmers and lending institutions.
2. Provide pre-service and in-service training to CSREES (Cooperative State Research, Education and Extension Service) educators in Illinois and Indiana.
3. Improve food safety and quality of aquaculture products for human consumption.
4. Increase the use of aquaculture information in secondary education.
5. Develop technical materials and utilize one-on-one consultation, hands-on training, and electronic technologies to the targeted audiences.



Biological Resources

Nonindigenous aquatic nuisance species such as the lamprey, alewife, and zebra mussel have tremendous impact on the Lake Michigan ecosystem and its reliant industries (e.g., commercial fishing, electrical power generation, etc.). Several of these species also threaten our inland waters. The potential introduction of additional species may have tremendous environmental and economic impacts on the Lake Michigan region. Water users and resource managers require new methods to prevent future introductions and more environmentally friendly and efficient methods to control existing infestations.

Many organisms in Lake Michigan, especially fishes, can accumulate a high concentration of toxins in their body fat that can be hazardous to humans if consumed. Managers need specific information on contaminant levels, and citizens who consume Lake Michigan fishes need to know how they can reduce their intake of these toxins.

The Lake Michigan fishery is in a constant state of flux due in large part, to the many external forces, both natural and anthropogenic which are exerted upon it. Managers need accurate information to make management and policy decisions about these fluctuations. Anglers and fishers also require information on the impact of any management decisions in order to become involved participants in management and policy discussions.

Goals

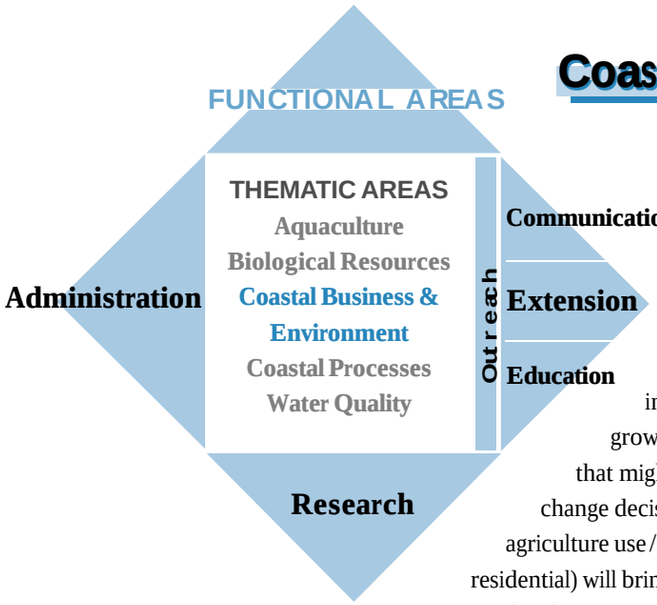
- Enhance the quality of the Lake Michigan ecosystem, inland aquatic systems, and the lives of coastal and shoreline residents by reducing the introduction, spread, and economic harm of nonindigenous aquatic nuisance species.
- Improve both the biological and human aspects of the Lake Michigan fishery through attainment, transfer, and application of knowledge concerning the Lake's food web and ecosystem dynamics.

Research Objectives

1. Develop a better understanding of critical and/or sensitive coastal habitats that may have a significant effect on the population dynamics of specific fish species and/or their food source.
2. Via an ecosystem approach, relate toxic substances/materials to trophic levels in the food chain that may be at risk because of high exposure.
3. Determine the present and future effect of recent infestations of exotic species on the food chain and biodiversity of southern Lake Michigan and inland waters. Identify likely new invading species and develop protocols to prevent their dispersal.
4. Via an ecosystem approach, study the food web dynamics in southern Lake Michigan to gain a better understanding of certain elements of the food chain and the chemical and physical factors that significantly affect them.

Extension Objectives

1. Empower users and managers of Lake Michigan and the inland waters of Illinois and Indiana to reduce the introduction of new nonindigenous aquatic nuisance species, and to cope with problems caused by existing species.
2. Educate Lake Michigan anglers, charter captains, and managers on the accumulation and synergistic effect of toxins in the organisms of the lake and its connecting waters to enhance their ability to make more informed decisions regarding consumption and management of Great Lakes species.
3. Educate anglers and charter captains on food-web and ecosystem dynamics of Lake Michigan thereby empowering them to be informed participants in the debate over management and regulation of the fishery.



Coastal Business & Environment

The growth of the regional economy will provide increased economic benefits to Illinois and Indiana. This growth, however,will also impose costs on society— costs that might not be readily apparent to those making land-use change decisions. The expansion of the metropolitan area from agriculture use / open space to urban uses (commercial, industrial and residential) will bring with it changes to the ways the regional watersheds are utilized as sources for water services. Services such as potable residential water, landscape irrigation, food production processing, and numerous manufacturing processes, will require increased public expenditures to create the infrastructure necessary to facilitate the many extractive uses that lake, surface, and groundwater provides. Additionally, as the region's watersheds are used in the disposal of by-products of human economic activity will expand. This will require public contributions to mitigate and remediate, the loading of waste to the region's watersheds. Much of the non-point source loading may result from land use changes which will have an impact on water quality throughout the region. Therefore, decision makers and citizens must understand the long-term costs to society created by current land use choices. Informed decisions are essential to ensure economically and ecologically sustainable coastal communities for the future.

The coastal areas of Illinois and Indiana provide the region's and the nation's citizens with immense recreational resources and services through recreational fishing, recreational boating, beaches, and coastal park areas. A measure of the total economic value of these resources and the contribution these resources have on the regional economy is not readily available to local and regional authorities. This lack of economic information makes it very difficult for municipal officials to make choices that effectively and sustainably balance the competing goals of conservation of coastal ecosystems and the development of coastal areas.

Within the Illinois-Indiana coastal region of Lake Michigan, there are numerous areas where decades of industrial pollution have contaminated sediments. Current proposals for remediation of these toxic sediments are very expensive. A comprehensive assessment of the benefits of remediation is difficult and has not yet been undertaken in the Great Lakes region.

Goal

- Enhance the economic climate and quality of life in Illinois and Indiana by supporting ecologically sound and sustainable coastal economic development.

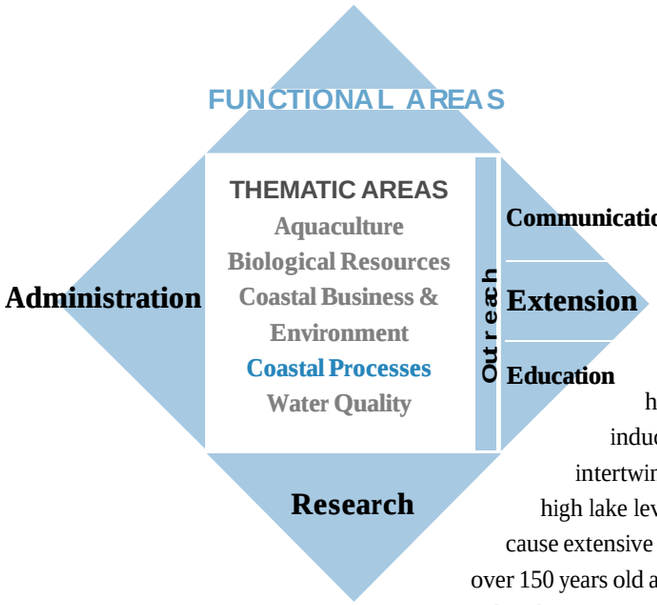
Research Objectives

1. Develop dynamic models of the ways coastal resources connect with and are impacted by the development of the regional economy.
2. Estimate the use and non-use values of coastal recreational resources and provide measures of the contribution of these resources to the regional economy.
3. Conduct specific cost-benefit assessments of individual local policy changes and public and private investments / interventions that impact coastal resources quality.

Extension Objectives

1. Provide science-based information to municipal officials and planners enabling them to make choices that effectively and sustainably balance the competing goals of conservation of coastal ecosystems and the development of coastal areas.
2. Provide citizens with critical data and explanations needed for them to understand the short- and long-term benefits and costs to society resulting from current land use choices. Informed citizens can participate in decision-making to ensure economically and ecologically sustainable coastal communities for the future.
3. Provide municipal officials, planners, and citizens with information that enumerates the economies of enhanced natural areas and natural resources.

Coastal Processes



The evolution of southern Lake Michigan's shoreline has been directly influenced by both natural and human induced processes. Over time, these processes have become intertwined. Natural coastal processes such as shoreline erosion, high lake levels, movement of sediment plumes, and beach erosion cause extensive damage to coastal areas. The shoreline of Chicago is over 150 years old and deteriorating. The retaining walls around the city need replacement within the next 5 years and will cost an estimated $500 million. Communities spend thousands of dollars replenishing beach sand. Heavy industry, public service companies, and marina development have added to or altered the natural shoreline and hence, the natural processes that affect it. As wealth and population in the region continue to increase, greater pressure will be placed on the utilization of the shoreline and near shore environment. In addition, homeowners and resource managers need low cost technologies to stabilize the shoreline near their homes and in critical habitat areas. Outreach assistance is not readily available to provide solutions to these problems.

Information is needed to better understand southern Lake Michigan's coastal evolution and to establish sound resource management decisions and engineering policies. The development of numerical models is critical to predict shoreline changes as influenced by natural and human activities. The effective integration of previously conducted and current research with future research is imperative. Data accumulation and synthesis concerning coastal process issues and the transfer of the information to policy makers and land use planners in a format that is useable and understandable, are equally important.

Goal

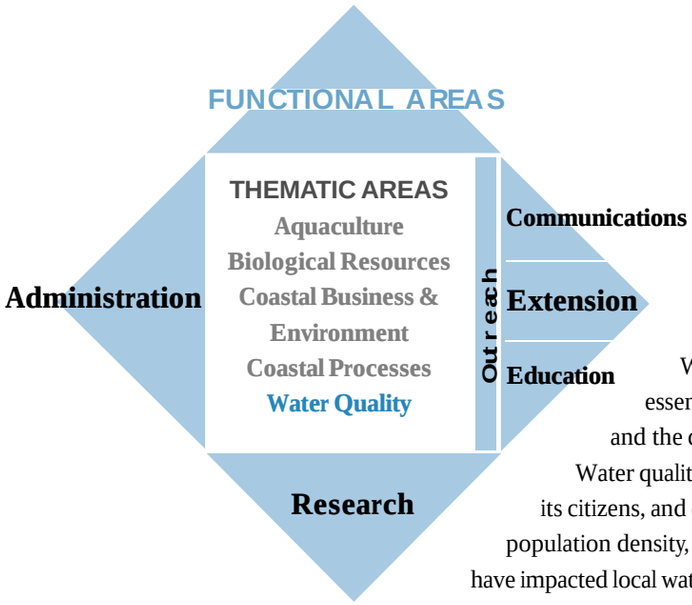
- Reduce structural damage, increase human safety, and reduce damage to coastal habitats and natural features caused by natural coastal processes.

Research Objectives

1. Determine how coastal processes are impacted by near shore hydrodynamics, sediment transport and coastal structures.
2. Develop and validate numerical models to predict southern Lake Michigan shoreline changes on a local scale.

Extension Objectives

1. Develop and deliver educational information and training which assists Lake Michigan researchers and managers in applying the latest technologies to address the southern Lake Michigan physical parameter problems.
2. Provide information and training to government, industry, decision makers, and the general public on the impacts of shoreline processes on shoreline evolution, sedimentation and topographic changes to assist them in assessing risks and making informed management and policy decisions.



Water Quality

Water is a basic necessity for all communities. Water is essential for human consumption, industry, and recreation use, and the quality and diversity of the environment in which we live. Water quality influences the health and well-being of a community and its citizens, and defines its economic base. The industrial revolution, heavy population density, and myriad land uses in the southern Lake Michigan region have impacted local water quality.

Bacterial and viral contamination of coastal waters in southern Lake Michigan are common occurrences during the summer. When bacterial concentrations exceed a safe level, swimming beaches are either closed or signage is used warning swimmers of the health risks. When beaches close, there is an immediate loss of tourism dollars. The subsequent heightened, negative view of the entire area may result in additional economic losses. Currently, information is lacking as to the source of the contamination, the vectors that disperse the contamination, effective methods for real time assessments, and effective methods to treat the contamination. Local governments, sanitary districts, health departments, park managers, property owners and beach users need science-based information that amplifies detection capabilities necessary to reach solutions to ameliorate or treat the health risks associated with this issue.

The waters of Lake Michigan and adjacent water bodies are favorite areas for recreational and subsistence anglers. A majority of these water bodies are contaminated by resident, persistent heavy metals, PCB's and PAH's. Many fish species found in these waters contain contaminants that exceed EPA advisory levels for consumption. The Chicago region and northwest Indiana are culturally diverse areas inhabited by many non-English speaking and lower income families who consume Lake Michigan fish for subsistence. These residents are in need of understandable information that will enable them to interpret and evaluate the potential health risks of consuming this food source.

The southern Lake Michigan region is currently under heavy development pressure. Most types of land development pose some influence on water quality whether it be increased runoff which may result in increased flooding and reduced groundwater recharge, or increased contaminated runoff from septic systems, roads, factories, or sewage treatment facilities. Many communities making planning and development decisions do not consider or have enough information about the impacts of these decisions on aquatic ecosystems and local water quality.

Goals

- Enhance the health of coastal residents by reducing the risks from contaminants and coastal pathogens.
- Increase Lake Michigan water quality by reducing non-point pollution stemming from increased land development.

Research Objectives

1. Develop a better understanding of the fate and effect of toxic chemicals and biological contaminants in near shore waters, the wetlands of southern Lake Michigan, and 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 controlled procedures.
3. Develop a better understanding of the impacts of sediments on coastal and wetland communities and the role of sediment / water chemistry in complexing chemicals, including toxins.

Extension Objectives

1. Inform and educate the stakeholders of southern Lake Michigan (government to the general public) on the impacts of human activities on water quality and water-influenced resources and how these environmental components impact quality of life. This information should modify behavior concerning the assessment of environmental risks and policy management decisions.
2. Provide research results on the source and scope of contaminants to local beaches and offer science-based recommendations to beach managers, scientists, media, legislators, and the public which promote informed management and policy decisions required for problem solving.
3. Provide information in a multi-lingual format to consumers of fish and other aquatic organisms detailing the potential health risks of consuming organisms obtained in contaminated water and the ways to reduce risk.
4. Provide local officials with the knowledge required to make economically sound and environmentally sustainable decisions in the future by incorporating decision making practices which reduce non-point source pollution and enhance future water quality.

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