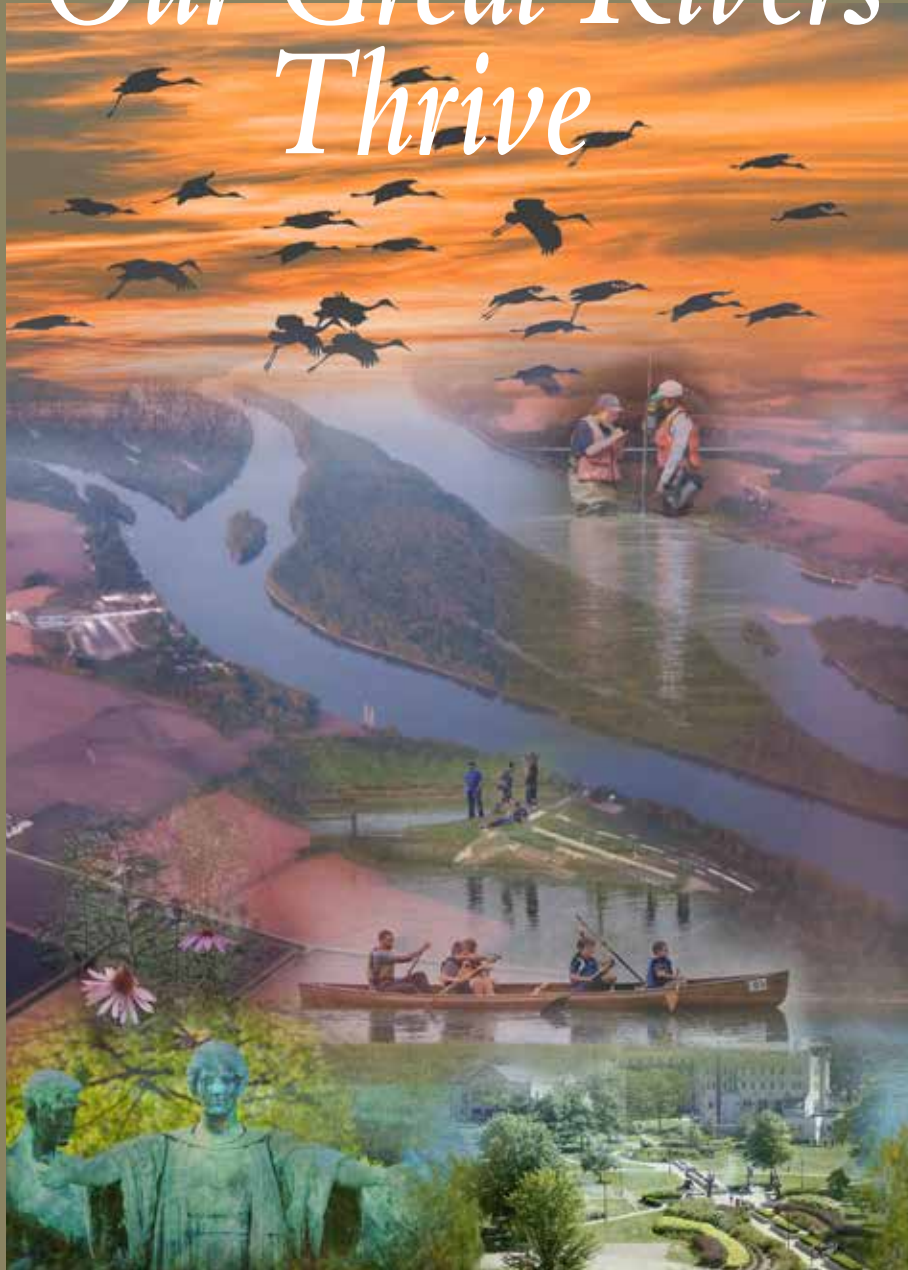


Helping Our Great Rivers Thrive



**The National Great Rivers
Research & Education Center**

Executive Director's Report 2000-2013



The following narrative chronicles the development of NGRREC from a simple idea to a complex reality. The past 13 years have seen rapid growth in both our programs and our physical space. NGRREC now has comprehensive research, education and outreach programs and a state of the art "green" building to house it, which is unparalleled in freshwater and watershed research. Much of NGRREC's growth must be

credited to Lewis and Clark Community College President Dr. Dale Chapman, whose unique talents have made the center possible. We both recognized that NGRREC was positioned to become the world-class research and education organization we could only dream of when we began our partnership. Another strong supporter in our formative years was Dr. Bob Easter, then dean of the University of Illinois College of Agricultural, Consumer and Environmental Sciences (ACES).

NGRREC is the first major research center in the U.S. to focus on the study of freshwater bodies and their interaction with the people who rely on them. NGRREC's mission to bring watershed and human science to management and policy will only strengthen as we mature as an organization and achieve worldwide recognition.

Dr. Gary L. Rolfe

Foreword



River floodplains are critical to the livelihood of human communities. For Illinois, three great rivers—the Mississippi, the Missouri, and the Illinois—contribute greatly to the economic and ecological wellbeing of our state and the nation.

That's why I am proud to support the National Great Rivers Research and Education Center, which is dedicated to the scientific study of great rivers and the communities that use them.

As a land-grant university, the University of Illinois has a commitment to engage with external audiences and partners to provide science-based knowledge that addresses critical needs of society. NGRREC represents a unique opportunity to focus on complex issues of vital importance to citizens in Illinois, the U.S., and the world.

Great rivers support life across the globe. Human communities cannot thrive without floodplain rivers and their watersheds, and we must manage these precious resources in a sustainable way.

Created in a successful collaboration among three very different institutions: the University of Illinois, the Illinois Natural History Survey, and Lewis and Clark Community College, NGRREC sets the standard for watershed and river research and management strategies with global implications as we investigate, protect, and sustain river systems amid growing populations and shrinking freshwater supply. The three have pioneered ways of working together, each deriving greater strength from their interactions.

In this partnership, the University of Illinois contributes research expertise and organizational strength, while the INHS brings a long history of natural resources surveying, and Lewis and Clark Community College provides access to local communities, as well as the means to train students for jobs that are needed in river management and elsewhere in the environmental sector. The strength of this triple strand and its implications for our scientific and entrepreneurial future cannot be overstated.

Scientists at NGRREC are discovering how to restore and enhance large rivers and their watersheds. The center is transforming the common perception of rivers as "industrial" to rivers as an invaluable natural resource: finite, fragile, and deserving of our most thoughtful stewardship.

NGRREC's contributions through research, education, and public engagement will provide scientists, lawmakers, and the public with critical knowledge to help us manage and sustain our great floodplain rivers, the watersheds that feed them, and the communities that interact with them.

Dr. Phyllis Wise, Chancellor
University of Illinois at Urbana-Champaign

Preface	4
Why a Great Rivers Center?	7
How NGRREC Came to Be	9
NGRREC at a Glance	16
Taking Shape	19
Learning About Great Rivers	23
Moving Beyond the Classroom	29
International Outreach	30
Spreading the Word	32
Expanding Our Reach	37
Keeping Track	39
How It all Adds Up	41

The National Great Rivers Research and Education Center gratefully acknowledges the founding support provided by Lewis and Clark Community College Board of Trustees.

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Preface

DR. GARY ROLFE,
NGRREC SCIENTIFIC FOUNDER

The story of the National Great Rivers Research and Education Center reflects a desire to take the lead role in studying the social, ecological, and physical dynamics of large rivers. It demonstrates a melding of the ambitions of scientists, academics, and higher education leaders from three very different institutions, working together in unprecedented ways. NGRREC has also benefited immeasurably from the contributions of dozens of collaborators and other partners, and a look back at the roots of our growing organization is both humbling and exciting — a testament to the power of big ideas and of tenacity to render them real.

While serving as head of U of I's Department of Forestry, I launched the concept of an Illinois-based ecological field station focused on the interactions among land, water, wildlife, and humans. As a result of my previous research and work at the University's Dixon Springs Agricultural Center and Field Station, I envisioned repositioning the agriculture center with a broader focus on natural resources. Although there was little success achieving that aim, we did create a campus dialogue, with many meetings to discuss the concept with other researchers.

Dr. David Thomas, chief of the Illinois Natural History Survey, played an important role in promoting the concept. Through him I worked with a variety of research and program leaders in watershed science and river ecology, which helped bring focus to the field station concept and led to the introduction of Dr. Richard (Rip) Sparks, a long-time collaborator from INHS with encyclopedic knowledge of the Illinois and Mississippi rivers. Dr. Sparks was instrumental in obtaining initial funding for the project with the proposal "Great Rivers Field Station: A Facility for Research and Education at the Mississippi-Illinois-Missouri River Confluence Area," which was submitted to the Illinois Department of Natural Resources Office of Capital Development and received funding for 18 months. This early work provided a foundation for our future development.

As founding head of the Department of Natural Resources and Environmental Studies in the College ACES, much of my charge was, in essence, to dream — to think strategically about how to differentiate and enrich our approach both to natural resource research and to the teaching of natural resource concepts. To that end, I continued to advocate for a field station at the river confluence. A research site there would greatly extend our reach, positioning us 150 miles downstate from the central campus. This was exciting to envision, but well beyond the means of any foreseeable funding sources in the college.

I enlisted the assistance of E. Louise Rogers, senior development officer in the College of ACES Office of Advancement, and we embarked on a concerted effort to find investors for a confluence field station. In the category of highly effective potential collaborators, one name arose repeatedly: Dr. Dale Chapman, President of Lewis and Clark Community College in Godfrey, Illinois.



The first meeting with Dr. Chapman was pivotal: although our ways of thinking and acting differ, we dovetailed immediately in a joint aim to make a confluence field station reality. Dr. Chapman embraced the idea wholeheartedly, saw

the potential to blend the strengths of our institutions into a new hybrid, and moved with the full force of his influence.

While a good idea is important, Dr. Chapman's ability to create and implement a road map for success has proven invaluable.

Chapman secured the support of U.S. Representative Jerry F. Costello (D-IL), who was instrumental in

Our view of the way to develop NGRREC has always been holistic: the study of freshwater rivers; of the watersheds that feed them; of the plants, animals, and humans that live within them; and of the interactions among all these parts. — Gary Rolfe

obtaining initial program funding and representing our interests to the State of Illinois to seek capital funding for the center's building. Other influential supporters included Senator Bill Haines, State Representatives Dan Beiser and Jay Hoffman and Governor Pat Quinn.

Bill Kruidenier, a colleague from U of I, provided skilled early leadership, with specific knowledge in budgeting, program development, and grant writing. Dr. Thomas leveraged his scientific knowledge and invaluable experience working with other organizations, such as the U.S. Geological Survey and the U.S. Army Corps of Engineers, and Dr. Richard (Rip) Sparks provided a steady and unwavering scientific influence.

Looking forward, NGRREC is envisioned to be a regional, national, and international focus for scholars of fresh water. We offer a venue for scientists to use laboratories, along with office space as an incubator for development of research projects.

Research at the station will lead directly to better management of these three great rivers, natural resources critical to the economic well-being of the United States.



We aspire for NGRREC to inform management and policy decisions on other river systems in the U.S. and throughout the world. Our education and outreach efforts, based firmly in research, help educate the public and reinforce the ties of human communities to the watershed.

A more detailed telling of our story follows, along with research and education milestones to date. I hope you are inspired by the vision and accept our standing invitation for a visit to the field station, where you can see us in action and learn more about the great rivers, which remain instrumental in shaping the history of our country.



PHOTO ABOVE: Dr. Dale Chapman, president, Lewis and Clark Community College and NGRREC chair

PHOTO TOP: Dr. Gary Rolfe atop the roof of the Jerry F. Costello National Great Rivers Research and Education Center Confluence Field Station, along the banks of the Mississippi river.



Crafting a Strategic Plan

In the fall of 2004 NGRREC created a five-year strategic plan. The plan, recrafted in 2010, continues to serve as guide stones for the growing organization.

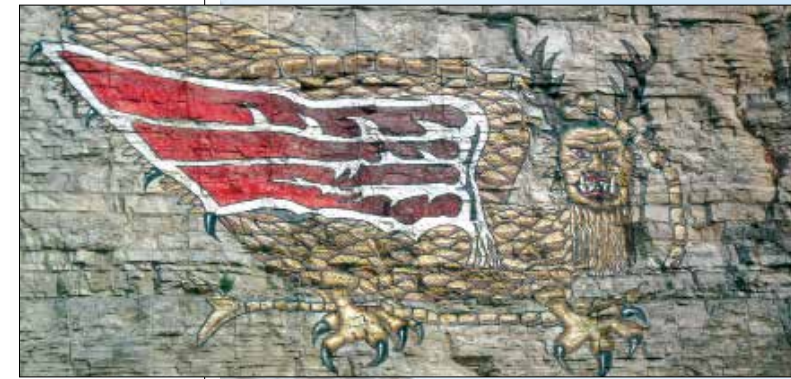
Goals

- To conduct research that makes significant contributions to our understanding of big rivers and their watersheds
- To actively solicit community and other stakeholder input to ensure that our research is truly relevant and responsive to societal needs
- To build and disseminate a corpus of research expertise that contributes to sound river management and the continuing sustainability of healthy and productive big river systems
- To promote the use of adaptive management and continuous improvement strategies that regularly apply lessons learned from the river/watershed sites to ongoing management practices and continuing research
- To develop and implement education and outreach programs that foster a greater understanding and appreciation for the great rivers
- To extend and apply knowledge gained from the research to protect and sustain the quality of river environments and to implement sound river management strategies and practices

NGRREC's Mission

The center's scholars and scientists study the ecology of the big rivers, the workings of the watersheds that feed them, and the ties to the river communities that use them.

Why a Great Rivers Center?



The mid-Mississippi confluence region has a real sense of place and time. Since the last ice age, the confluence has played a central role in the development and advancement of civilization and, subsequently, our nation. —Dr. Dale Chapman

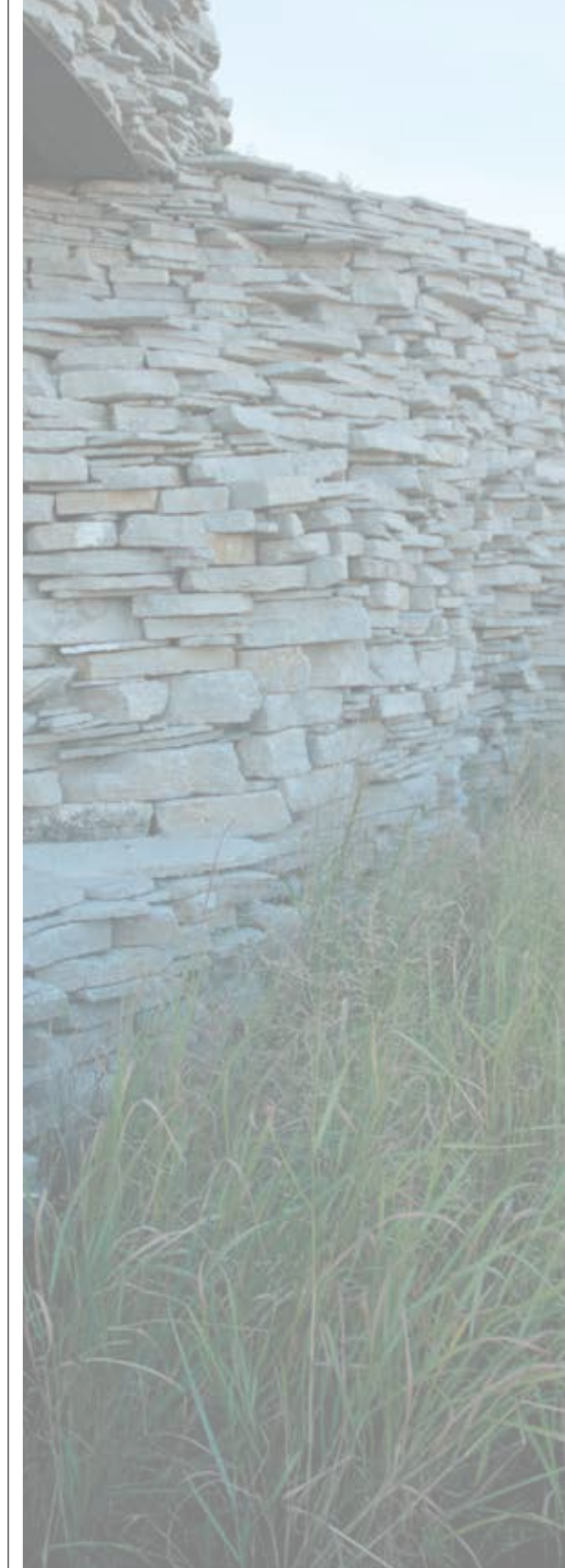
Three of America's great rivers—the Mississippi, the Missouri, and the Illinois—come together in southwestern Illinois, forming one of the largest river plains and watersheds on the continent. The region surrounding the Great Rivers confluence is like no other floodplain in the Americas, with an aquatic and terrestrial history that has been documented to the Mesolithic Period, nearly 10,000 years ago.

This area is home to the National Great Rivers Research and Education Center (NGRREC, pronounced "en-greck"). Established in 2002 as a natural resources field station focused on researching rivers and watersheds, NGRREC is strategically located near the Great Rivers confluence. The organization is an international center for science, education, and public outreach, with the goal of improving the sustainable management and vitality of large rivers.

River Health Matters

Humankind relies on rivers for transportation, drinking water, irrigation, food supply, recreation, tourism, and waste management. Humans have also affected rivers throughout history—building dams, installing levees, removing water for irrigation, and power production adding polluting elements, and creating other stressors. Humans depend on many resources provided by floodplain-river ecosystems, and they have affected these ecosystems in ways that often benefit one resource while damaging another (such as the use of rivers for both drinking water and disposal of waste).

The Mississippi River system is the third-largest watershed in the world and the northern hemisphere's most biodiverse aquatic ecosystem. Home to more than 145 species of fish and a flyway for more than 60% of North American birds, it is also crucial for the well-being of human communities in the floodplains. More than 50 cities and 15 million Americans rely on the Mississippi River for their primary water supply. More than 60% of all U.S. grain exports are shipped on the Mississippi River, and 90% of all U.S. agricultural exports are produced in its watershed. Recreation and tourism along the Mississippi River are vital to the financial welfare of the states through which the river runs. Leisure travelers alone generate twelve million visit the Mississippi River corridor every year, generating more than \$12 million in revenue and more than 140,000 jobs, while hunting and recreational fishing alone generate \$3.2 billion in revenues each year to Illinois.



River Health Calls for Collaboration

Managing large river systems is extremely challenging. Scientific research is needed to sustain the economy and ecological health of great rivers and their watersheds, but study of large rivers has lagged far behind that of other aquatic ecosystems, such as oceans and the Great Lakes.

River Health Requires Knowledge

Since its inception, NGRREC has collaborated with the U.S. Army Corps of Engineers, the Great Rivers Land Trust, the Nature Conservancy, the Northeast Midwest Institute, Conservation Fund, Audubon and numerous additional local, state, and federal agencies and non-governmental organizations. Today the center conducts solid research and translates research knowledge into outreach to expand public understanding of large rivers and watersheds. NGRREC hosts regular national conferences and symposia for scientists and the public, and the center cooperates with schools on educational programs for youth of all ages.

NGRREC's summer internship program draws college students from Illinois, Missouri, Wisconsin, and 20 other states to be matched with natural resource-related organizations, and NGRREC scientists have forged collaborations with scholars and experts from Cambodia, China, Colombia, India, Ireland, Laos, Thailand, Viet Nam and other countries.

The Illinois RiverWatch Network, previously managed by the Illinois Department of Natural Resources, was entrusted to NGRREC in 2005. RiverWatch citizen volunteers collect samples from rivers throughout the state, providing invaluable data for monitoring water quality and stream ecology.

In a few short years, NGRREC has become a vital regional and national resource for river research and education. Much has already been accomplished, but there is no shortage of continuing vision. The center's intent is to expand the geographic reach of monitoring programs and the species being monitored to provide a solid scientific base for understanding long-term changes in the ecology of the river system and its species.

One vision is to establish a Great Rivers Ecological Observatory Network (GREON), a global collection of continuous-monitoring stations, digitally linked to provide real-time information on rivers and to make possible more nimble responses to changing conditions.

Long term, NGRREC's goal is to be the primary science-based knowledge connector for the region between the Great Lakes and the Gulf of Mexico. Research is the foundation.

To protect and sustain the quality of river environments, the knowledge gained from that research must then be applied through sound river planning and management.

Ongoing translation of that knowledge into public education and outreach is needed to foster understanding and appreciation for great rivers. NGRREC is strategically positioned to accomplish all of those aims.

NGRREC also stands as a successful example of forging the strengths of land-grant institutions and community colleges into a model of collaboration. While land-grant institutions have much to offer in research expertise and resources, community colleges are the channel to connect and engage with local communities, providing education and training relevant to regional industries and professions. Each partner benefits from the other's strengths.

This publication tells the NGRREC story, from the time it was just an idea to the research and education institution it has become overlooking North America's great watershed.



PHOTO ABOVE: (left to right) Colonel Thomas O'Hara, US Army Corps of Engineers; Mark Gorman, policy analyst for Northeast-Midwest Institute; Congressman Jerry Costello; and Dr. Bob Easter, then Chancellor of the University of Illinois at Urbana-Champaign at the October 26, 2010 dedication ceremony for the Jerry F. Costello Confluence Field Station. Nearly 800 supporters attended the event.

How NGRREC Came to Be

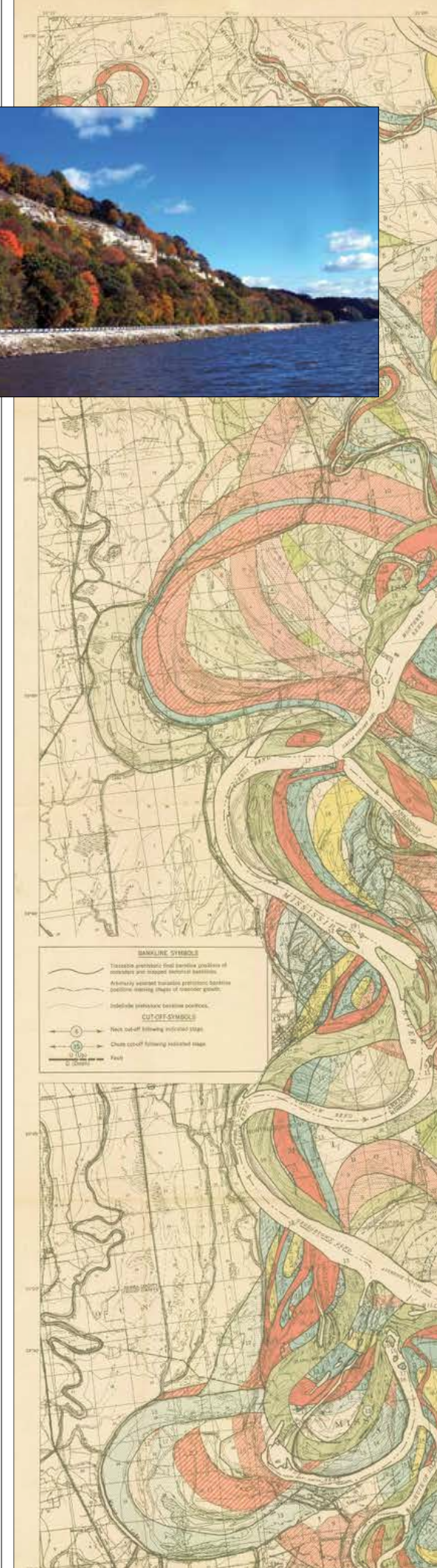
The success of the National Great Rivers Research and Education Center can be attributed to bringing together the right players in the right place at the right time. We had an idea, and all the elements came together. —Gary Rolfe

The idea of creating a natural resources field station in Illinois to study rivers, riparian forests, and watersheds was first conceived by Dr. Gary Rolfe at Illinois as he held various leadership positions. The growth of this seed of a concept into a full institution is a story of both divergence and collaboration. Scientists, college administrators, government officials, and others worked through sometimes-conflicting ideas and interests and overcame institutional differences and biases to reach a common goal of protecting America's vital natural resource for future generations.

The confluence of the three rivers offered a unique location for a research center, and the right team was soon together at the discussion table: the University of Illinois at Urbana-Champaign, the state's land grant institution; Lewis and Clark Community College (L&C), focused on regional and local issues of the confluence area; and the Prairie Research Institute's Illinois Natural History Survey, with more than 150 years of research and monitoring of the state's natural resources.

Head of the U of I's Department of Natural Resources and Environmental Sciences (NRES), Rolfe was uniquely positioned to champion a new kind of field station. NRES's focus on studying watersheds, humans, land use, water quality, soil loss, sedimentation, and bird population dynamics complemented INHS's long history of monitoring and research of rivers and watersheds. L&C's proximity to the confluence area and ACES's interest in creating a locally rooted research and training center made L&C especially attractive as a local partner. But moving from concept to creation took several years of hard work and the support of many key players; the short version of the story follows.

PHOTO ABOVE: Pool 26 of the Mississippi River



Setting the Stage

Developments of the preceding decades had created a political climate conducive to obtaining support and funding for a center to study rivers. In 2000, a series of meetings to discuss developing a field station were organized with potential St. Louis-area investors, led by E. Louise Rogers of the College of ACES Office of Advancement. Rodman St. Clair, a retired executive and an active community philanthropist, introduced Rolfe to Dr. Dale Chapman, president of L&C. Rolfe presented the idea of a natural resources field station dedicated to river research. Chapman, known by many as a visionary and entrepreneur, immediately seized the potential and committed the college as a key leader in the movement.

The collaboration of Rolfe and Chapman became the driving force behind the realization of a research and education center dedicated to rivers and watersheds. Also critical was the early support of U.S. Congressman Jerry F. Costello and of key scholars, civic leaders, and government officials.

Even with various persons and entities on board with the idea of a river research center, the herculean task of creating a workable organizational concept remained: to identify in one clear, succinct page the mission, vision, purpose and research, education, and partnership opportunities of such a center. This process was successfully completed under the leadership of Bill Kruidenier of the UI Department of NRES, who continues to supervise employees, programs, and administrative affairs as NGRREC's associate director.



PHOTOS (Above) Bill Kruidenier and (Right) Dr. Richard (Rip) Sparks on the right with colleague Wolfgang Junk at a conference in Botswana

In 2001 NGRREC was introduced to the St. Louis Agribusiness Club and member Ron Scherer, who facilitated contacts with numerous local and regional businesses dependent on the Mississippi River. With his help a communication plan was drafted to market the NGRREC concept to a variety of groups, including the River Bend Area Growth Association, with 650+ members in 13 communities.



Dr. David Thomas, then chief of the INHS, was a strong academic supporter for the center. Dr. Richard (Rip) Sparks, also of INHS, was enormously effective in obtaining funding and establishing connections, not only in Illinois and surrounding areas, but internationally.

INHS had a well-established research program on the Mississippi River. INHS studies on Pool 19 (a section of the Mississippi River, and on the LaGrange Reach of the Illinois River both as part of the U.S. Geological Survey's Long Term Resource Monitoring Program (LTRMP) element of the Upper Mississippi River Restoration - Environmental Management Program (UMRR-EMP) added a strong scientific database for future research by NGRREC scientists. The research base was later expanded by the addition of aquatic and terrestrial ecologists to the NGRREC staff.

Dr. John Chick, director of the Great Rivers Field Station in Brighton, Illinois, on Pool 26, operated by the INHS, joined NGRREC in 2002, bringing invaluable connections with federal granting agencies.

Other key advocates were Representative Steve Davis, Senator Bill Haine and Representative Jay Hoffman and later Dan Beiser. Many advocates of river research worked diligently to secure funds for the project, including Colonel Michael Morrow with the U.S. Army Corps of Engineers.

MILESTONES

During NGRREC's formative years, the corps provided invaluable assistance in locating a building site with river access for the new field station. Representative Costello requested that the new facility be constructed in his district, and the preferred site was determined to be just east of the esplanade near the Great Rivers Museum. The U.S. Army Corps of Engineers approved a long-term lease for the building site, and ground preparation discussions soon began.

On May 6, 2002, the National Great Rivers Museum in East Alton, Illinois, hosted an opening ceremony to announce the founding of NGRREC to the public. ***A formal intergovernmental agreement was signed on July 9, 2002, among the three principal partners—the University of Illinois, the Illinois Natural History Survey, and Lewis and Clark Community College—who agreed to work with affiliate organizations to further the goals of the center.***

The formalization of this partnership laid the foundation for a more formal agreement the following year. Fusing the collaborative strengths of a land-grant university, an esteemed research institute, and a local community college was largely unprecedented.

In April 2003 the L&C Foundation was designated the legal entity to operate NGRREC, with a separate board of directors to oversee administration and management. Dr. Chapman was selected to chair the board, with Dr. Rolfe named the founding executive director. ***Rep. Costello assisted with an early achievement, securing funding through the U.S. Department of Education's Fund for the Improvement of Post-Secondary Education (FIPSE).***

On April 7, 2003, a groundbreaking ceremony was held at the construction site, where Costello presented the funding for staffing and programming. Partner contributions along with continued FIPSE support were NGRREC's initial sources of funding.

With the board and key leadership in place, NGRREC continued strengthening relationships with other area organizations; notably, in 2003 the Great Rivers Land Trust requested formal identification as an affiliate partner. Don Miller, at that time executive director of the Great Rivers Museum Foundation, asked for a formal partnership among the Meeting of the Rivers Foundation, the Great Rivers Museum, and NGRREC. At the same time, the U.S. Army Corps of Engineers' St. Louis District presented a Memorandum of Understanding confirming their affiliation. An advisory board comprising members from affiliated organizations was formed to provide input, advice, and recommendations on NGRREC direction and programs.

PHOTOS: (Above) Lewis and Clark Community College campus in Godfrey, Illinois, and (Right) graduates of the University of Illinois at Urbana-Champaign



With the organizational fundamentals now in place, NGRREC began to build the center's education efforts. Teaching educators and training them to teach their students in turn is a crucial component of sustaining the viability of great rivers. The program for elementary school students flourished under the leadership of Dr. Marvin Mondy, an environmental educator at L&C. Dr. Mondy piloted a watershed program for grades 5 to 8 that became the Water Festival, a popular event that attracts nearly 1,000 fifth grade students and their teachers each year. Offering 30 hands-on activity stations to promote awareness of water resources, the festival is one of NGRREC's flagship programs.

In 2003, the first college students were placed as summer interns with water resource-related organizations. Interns are assigned specific river research projects, for which they conduct field experimentation, use protocols for data and specimen collection and cataloging, and learn to analyze, synthesize, and interpret data and create research reports.

Interns experience the challenge of presenting their findings in a symposium at the end of the summer. Twelve students from the University of Illinois and L&C were the first interns in 2003. Since inception, NGRREC has placed 255 interns from 42 participating institutions in 15 states.

In December of 2003 ***an undergraduate guaranteed transfer program, spearheaded by Bill Kruidenier and L&C was formalized.*** The agreement guarantees acceptance of L&C students to the U of I as juniors in natural resources and environmental sciences for students who have met the necessary transfer admission requirements in their time at L&C.

The next step for NGRREC was to begin developing the outreach and public engagement component of the center's mission. On April 15, 2004, Drs. Chick and Sparks hosted NGRREC's first national meeting. The symposium, "Indicators of the Health of Great Rivers," spotlighted complex water systems, with scientists discussing the latest techniques to evaluate the health of rivers. NGRREC continues to bring together river experts and other interested professionals in national public symposia and conferences. Crystal Bartanen joined NGRREC as program administrative assistant the same year adding organizational support for the center's growing programs.

Congressman Costello's strong and continued support helped NGRREC become known among many decision makers and political leaders. As Costello continued to cultivate funding for the center, additional lawmakers began pledging their support, such as Illinois Lieutenant Governor Pat Quinn, who delivered a keynote address at a reception for NGRREC in September 2004.

In 2005, NGRREC assumed responsibility for the state's RiverWatch program, leading to funding from the McKnight Foundation. Initiated in 1995

by INHS, Illinois RiverWatch is a science-based citizen monitoring program dedicated to collecting data about Illinois streams. When state budget shortfalls affected the program in 2004, Friends of the Fox River took it on with assistance from the Lieutenant Governor's office, and the following year RiverWatch was moved to NGRREC. Olivera Bojic was named coordinator and RiverWatch flourished under her guidance. Integral to the professional scientific monitoring effort in Illinois, RiverWatch is nationally recognized as a successful model of citizen science.

Since its transfer to NGRREC, the program has increased significantly the numbers both of volunteers trained and enlisted and of sites sampled. In 2011 the first symposium was held to release analysis of 15 years of data collected by citizen scientists; reports are posted online at www.NGRREC.org/riverwatch.

Seeing the need to house NGRREC's growing research and education staff in a central location until the field station was built, Dr. Chapman allocated temporary office space on the L&C campus and provided operational support. Jessica Pascoe, hired in 2005 as NGRREC's first environmental educator, is credited with developing many of the center's educational programs.

Dr. Lyle Guyon joined NGRREC in 2005 to establish the terrestrial ecology research program—the focus of the relationship between vegetation communities and the environmental characteristics of big river floodplains in the Upper Mississippi River system, as well as habitat use by wildlife and control of invasive species.

NGRREC experienced a monumental year in 2006, with the appropriation of \$6.8 million in state funds. This funding, made possible by the strong support of Senator Bill Haine and Representatives Jay Hoffman and Dan Beiser, allowed for final revisions to the building plans and preparation for construction bids for the field station.

This level of commitment signified to the founding partners that NGRREC would succeed, have its own identity and a new home. Additional funding from the Illinois Clean Energy Community Foundation covered design changes to increase the field station's LEED standard from silver to gold, and funding from the U.S. Department of Transportation and Madison County paid for infrastructure and roadways.

A communications liaison and policy advisor was hired in 2007 to provide executive support, and develop relations with internal and external partners. This work was critical in carrying out mission-related programs and activities, establishing endowments, and working in tandem with the University of Illinois.

In 2007 more than 430 acres of bluff property on the Meeting of the Great Rivers Scenic Byway between Alton and Grafton, known as the Palisades Preserve, was purchased from the Adams family by the Great Rivers Land Trust with support from The Conservation Fund and later given to the L&C Foundation.

The preserve's oak and hickory forest looks much as it did 100 years ago, and it is one of the best remaining examples of undisturbed, biologically important lands that support many species of conservation concern. A comprehensive management plan was developed among the partners, and a five-year stewardship grant was awarded to NGRREC to manage the property. Today, the Palisades are used for ecosystem studies, watershed research and training and education programs where key wildlife habitats are protected.



PHOTO: (Above) Interns removing invasive honeysuckle from the Palisades Preserve



Being Honored for Work of Distinction

In 2010 NGRREC was honored by receiving University of Illinois **Chancellor's Award for Excellence in Public Engagement**, recognizing faculty, academic professionals, and students who engage the public on critical social issues.



As a result of work to elevate the profile of NGRREC in Washington, D.C., in 2011 the U.S. Water Alliance named NGRREC one of five national recipients for the inaugural **U.S. Water Prize**. The prize, established to honor outstanding achievements in advancing sustainable solutions to our nation's water challenges, is the first of its kind to recognize success in protecting and improving the health of the country's watersheds. Other recipients included the City of Los Angeles, Milwaukee Water Council, New York City Department of Environmental Protection and the Pacific



PHOTO TOP: Receiving the Chancellors award for excellence in public engagement (left to right) Dr. Lyle Guyon, Dr. John Chick, Dr. Brian Anderson, Dr. David Thomas, Crystal Bartanen, Dr. Jeff Brawn, Dr. Gary Rolfe, Bill Kruidenier and Dr. Dale Chapman.

PHOTO ABOVE: Dr. Dale Chapman receiving the U.S. Water Prize



Making a Field Station Reality

With \$6.8 million in construction funding secured, the L&C Board of Trustees authorized Phases I and II of constructing the new field station that began in the spring of 2008.

The National Great Rivers Museum in Alton and officials from the partner organizations hosted a ceremony and reception marking NGRREC's official launch. Phase I included the core building for educational exhibits, research and lab facilities, offices, and a garage with space for vehicles and the boats necessary for research and monitoring activities.

The building was designed with sustainable features inside and out to exemplify NGRREC's environmental mission, and a low architectural profile was chosen for minimal visual and physical intrusion on the landscape.

In 2009 Illinois Governor Pat Quinn allocated an additional \$16.3 million in the state's capital bill to fund construction of the field station, assuring sufficient resources to complete Phases I and II and build mesocosms to expand NGRREC's research capacity. The funds also allowed NGRREC to add hydrologic and wildlife labs, critical storage space, and additional office space for scientists and students; Phase II began in 2012.

Looking Forward

In the summer of 2011, a new Memorandum of Understanding (MOU) was signed to document an ongoing financial and operational partnership between Illinois, L&C, and NGRREC. This enhanced MOU provides a solid institutional footing for NGRREC into the future. It provides funding for an additional researcher in watershed science and the basis for a comprehensive University of Illinois Faculty Fellows program to bring eight exceptional scientists into the NGRREC research team each year. The Faculty Fellows Program annually brings eight exceptional scientists into the NGRREC research team.

The comprehensive programs of research, teaching, and outreach established by NGRREC over the last ten years, coupled with an expanded relationship among its institutional partners, position the center well to achieve its goals of national and international prominence in freshwater research and policy."



2000–2012

NGRREC at a glance

2000

The concept of an off-campus natural resources field station administered by the University of Illinois College of Agricultural, Consumer and Environmental Sciences (ACES) is proposed.

Dr. Gary Rolfe, head of the College of ACES Department of Natural Resources and Environmental Sciences (NRES), meets Dr. Dale Chapman, who quickly engages Lewis and Clark Community College as a key player in advancing a center to study great rivers.

Support for a river research center is secured from U.S. Congressman Jerry F. Costello, key scholars, civic leaders, and other government officials.

2002

A formal agreement among U of I L&C, and Illinois Natural History Survey establishes the National Great Rivers Research and Education Center.

The NGRREC receives \$100,000 in funding through the U.S. Department of Education.

Great Rivers Museum hosts an opening ceremony to announce the founding of NGRREC. Congressman Costello requests the organization's facility be built in his district.

The U.S. Army Corps of Engineers assists with a successful search for a building site with large-river access and a long-term lease.

Aquatic scientists are hired.

2003

A director, associate director, director of research, and environmental educator are hired, and NGRREC's first education programs are developed.

International connections are made with India.

An internship program is launched, with 12 students from U of I and L&C matched with relevant organizations.

A brand is developed for NGRREC.

An undergraduate transfer program formalized allowing L&C students to transfer into NRES.

The groundbreaking ceremony for a confluence field station held at the site.

2004

NGRREC hosts "Indicators of the Health of Great Rivers," a first national symposium on complex water systems.

An advisory board is formed.

Illinois Lieutenant Governor Pat Quinn delivers the keynote address at a public reception for NGRREC.

Strategic planning produces goals for 2005 through 2009.

2005

A second symposium is held: "A Confluence of Interests: Nature and Tourism in River Cities and Rural Areas."

A terrestrial scientist is hired.

The Illinois Riverwatch Network is transferred from the Illinois Department of Natural Resources to NGRREC.

2006

Environmental educator and RiverWatch coordinator positions are filled.

\$6.8 million is received to facilitate construction of the confluence field station.

NGRREC hosts third and fourth public symposia: "Lessons from Deep History" and "Illinois Cache River."

2007

An environmental communications liaison and field biologist are hired.

2008

Construction of the field station begins.

International connections are made with China, South America, the Lower Mekong River Commission: Laos, Cambodia, Thailand and Viet Nam.

Additional educators are hired to strengthen and expand K-12 programming.

2009

\$16.3 million in construction funds are secured as part of the State's capital bill.

Symposium and proceedings of "Visions of a Sustainable Mississippi River: The Confluence of Ecological, Economic, and Cultural Values" are shared with elected officials and agency decision-makers.

2010

NGRREC receives the U of I Chancellor's Award for Excellence in Public Engagement.

The grand opening of the Jerry F. Costello Confluence Field Station is celebrated in October.

2011

NGRREC wins the U.S. Water Prize from the U.S. Clean Water Alliance.

A Memorandum of Understanding signed among U of I, L&C, and NGRREC. Research and staffing dollars are committed by the U of I and L&C.

RiverWatch releases 15 years of data gathered by citizen scientists.

"Bottomland Ecosystem Restoration: Bridging Science and Management" brings together experts in a 3-day national conference.

2012

Positions for senior scientist, watershed scientist, agricultural conservation field manager, and senior scientist are filled.

A Faculty Fellows Program is created to spur involvement with NGRREC.

The Great Rivers Ecological Observatory Network is initiated.

Phase 2 of field station constructions begins for building mesocosms and new labs.

Great Lakes to Gulf Virtual Observatory portal initiated.

The land-grant/community college concept is initiated.



PHOTO: Visiting scholars from England's University of Leeds walk the grounds at the field station.



Taking Shape:

THE CONFLUENCE FIELD STATION

On October 26, 2010, the partnership joining the University of Illinois at Urbana-Champaign, the Prairie Research Institute's Illinois Natural History Survey, Lewis and Clark Community College, the State of Illinois, and the federal government culminated in the dedication of NGRREC's Jerry F. Costello Confluence Field Station.

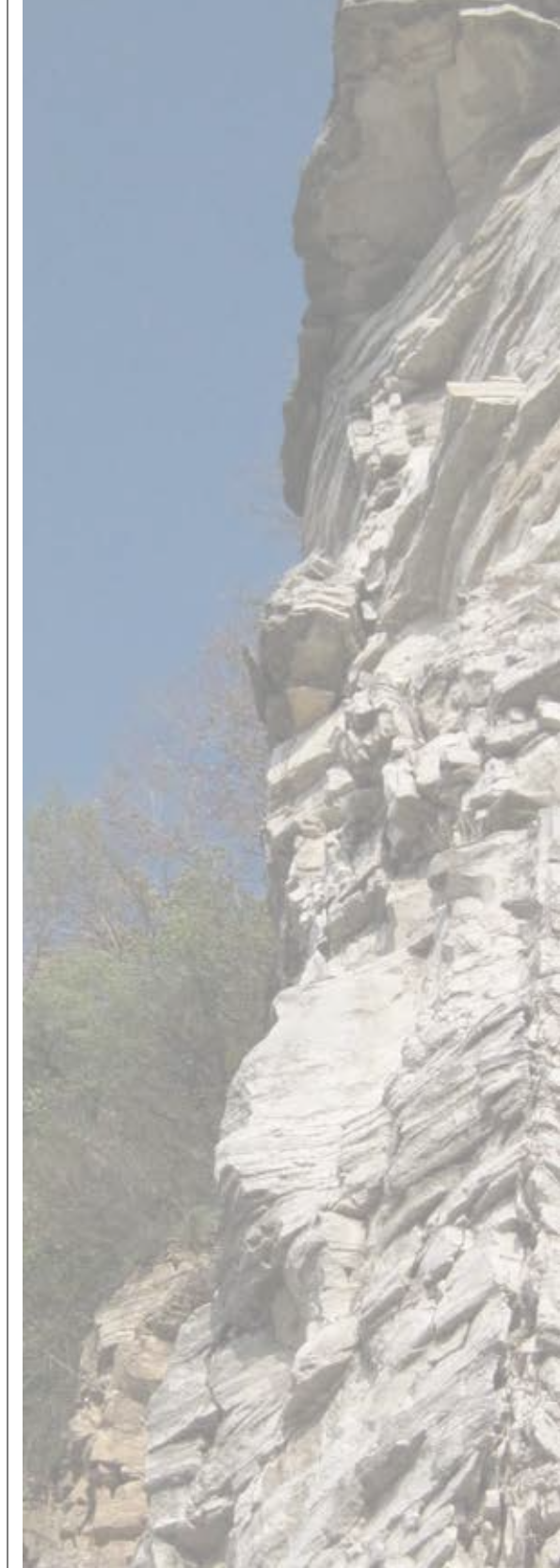
Sitting on 35 riverside acres, the field station provides superb access to the Mississippi River. The 32,000-square-foot building and the surrounding landscape constitute a unique campus for applied science, technology, and education and outreach committed to excellence in protection and management of our freshwater resources.

The field station is situated immediately downriver from the Melvin Price Locks and Dam, among the busiest in the U.S. inland waterway system, as well as the National Great Rivers Museum, a visitor center managed by the U.S. Army Corps of Engineers that attracts 100,000 visitors a year.

Situated in an area with rich water resource infrastructure—local, state, federal, and private—the Confluence Field Station is a living laboratory designed for the study of rivers and their floodplains and the management of regulated streams. Directly across the Mississippi lies the 800-acre Maple Island, licensed to NGRREC for ecological research. Program managers at the U.S. Army Corps of Engineers, the U.S.G.S., the U.S. Department of Agriculture, and the U.S. Environmental Protection Agency provide funding for applied research to inform federal water resource management efforts. Private investments combined with federal resources help advance this effort.

Approximately thirty minutes north of St. Louis, a 30-mile stretch of the Mississippi River known as the Confluence Reach is home to two national wildlife refuges, the Meeting of the Rivers National Scenic Byway, thousands of acres of public open space, a renowned migratory bird sanctuary attracting 200,000 visitors a year, historic and river-themed attractions, and authentic river communities that attract leisure travelers and provide a gateway to the largest river system in North America.

The field station's unique design integrates seamlessly with the river environment, and the building was constructed with numerous sustainability features. The goal for the building and the construction process is to obtain the highest level of LEED (Leadership in Energy and Environmental Design) certification.



Jerry F. Costello

Confluence Field Station

The Confluence Field Station was carefully planned to minimize its environmental impact while evoking and complementing its natural setting.



The National Great Rivers Research and Education Center received the Excellence in Design Award for Overall Innovation in 2010 from the Center for Environmental Innovation in Roofing. The award, based on energy efficiency, durability, material management, water management and production of renewable energy, reinforces the mission of advancing environmental stewardship.

The roofing system is a green living roof with 6 inches of recycled material/styrofoam insulation, 12 inches of growing medium (special “manufactured” soil), native grasses, an observation deck (educational area), and an ADA-compliant accessible ramp. Phase II includes a 4,800-square-foot addition containing a water quality lab, a wildlife habitat lab, and additional conference and office space. Scientists will have the ability to preserve samples in staging areas to be sent to other institutions for study, greatly enhancing opportunities for collaboration.

PHOTO ABOVE: NGRREC staff on the roof of the field station.

Mesocosms

Mesocosms connecting labs at the field station directly to the Mississippi river allow NGRREC scientists to study river water on site and make adjustments to conduct studies with multiple parameters. The mesocosms, three pairs of 75-foot by 6-foot concrete raceways, pump 3 million gallons of flowing water and plankton a day from the river, allowing researchers to focus on predicting effects on river fish populations and developing conservation strategies.

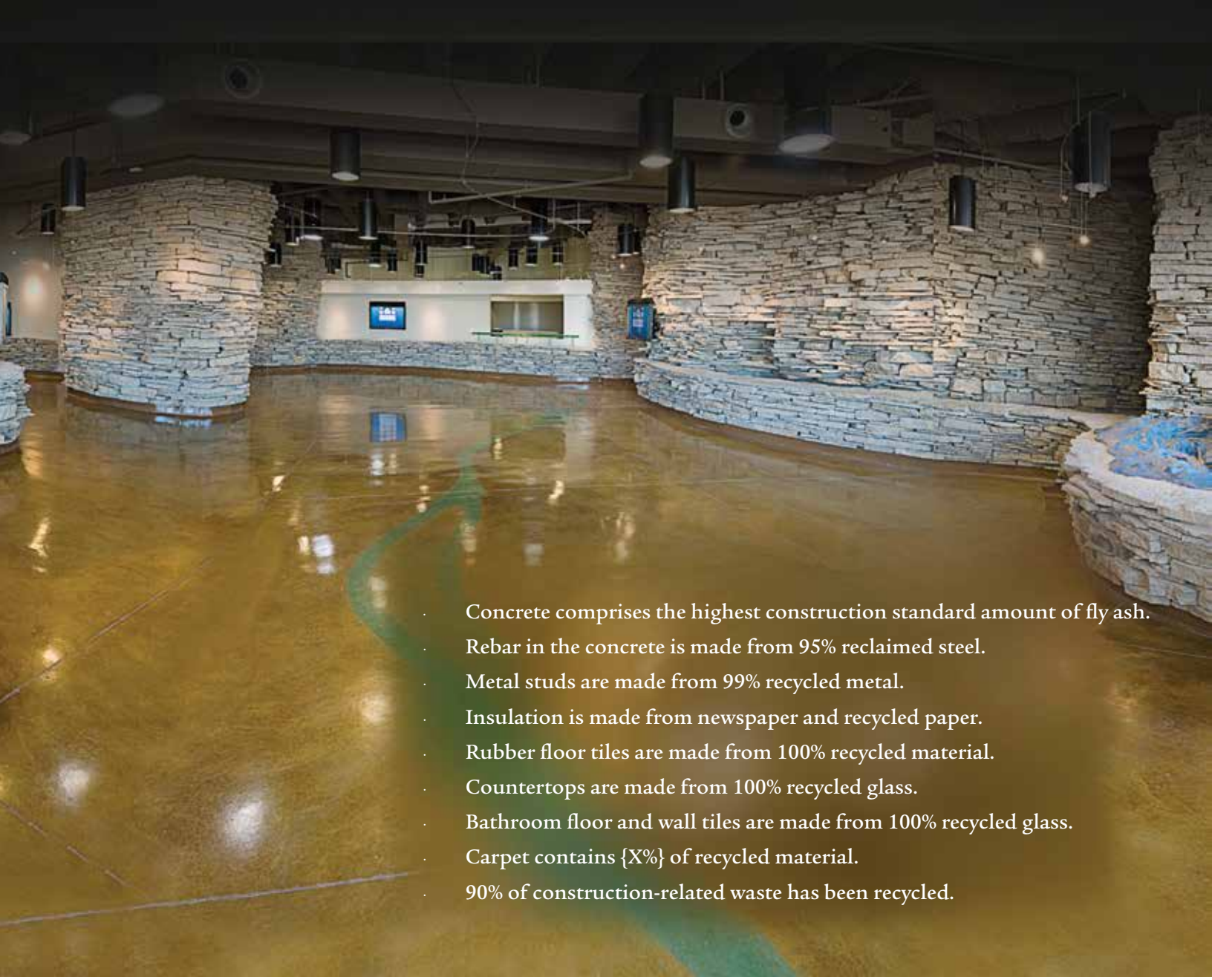
Semi-recessed below the deck, situated three feet above the grade and three feet below grade, each raceway has individual electronic control of the water depth, velocity, and volume, so that experiments may be conducted simultaneously with multiple parameters.

The delivery system includes a state-of-the-art head tank for the river water delivery system, mesocosms, associated sump pits, and a river water supply pipeline that connects the field station with the nearby water delivery system at the Dynegy power plant.

Weirs (low-built diverting dams) and screens of different sizes can be placed at different locations in the mesocosms to offer scientists greater options for setting up experiments. With the delivery system installed, river water is pumped into the wet labs for analysis and testing.



PHOTO (Above) Construction of the mesocosms



- Concrete comprises the highest construction standard amount of fly ash.
- Rebar in the concrete is made from 95% reclaimed steel.
- Metal studs are made from 99% recycled metal.
- Insulation is made from newspaper and recycled paper.
- Rubber floor tiles are made from 100% recycled material.
- Countertops are made from 100% recycled glass.
- Bathroom floor and wall tiles are made from 100% recycled glass.
- Carpet contains {X%} of recycled material.
- 90% of construction-related waste has been recycled.

AIR HANDLING

- A chilled water-cooling system supplemented by river water and ice storage tanks controls the internal air temperature. Ice created at night cools the water that flows through a coil inside it to about 40 degrees, which in turn cools the air.
- The heating system uses separate electric heat in every office and classroom for efficiency. The station generates its own electricity from a blend of alternative energy sources.
- A heat wheel captures a tempered portion of air and recycles it throughout the facility, eliminating the need for an energy/gas furnace.
- Rooms have individual thermostats and occupancy sensors to minimize wasteful heating and cooling when they are unused.

WATER EFFICIENCY

- A river-water system feeds wet labs and the educational pond; a stormwater system feeds exterior hose bibs and garage washdown; a grey water system feeds toilets and urinals for flushing; and a domestic system feeds hand sinks and water fountains.
- Onsite sewage treatment with tertiary and secondary wetlands feeds into a 5,000-gallon greywater storage tank.
- The stormwater collection system captures and stores 100% of roof water, and diverters remove large debris and direct stormwater to a 10,000-gallon tank.
- Water is heated by solar tubes mounted on the roof, where it is stored for use.

Learning About Great Rivers

More than a century ago, in 1895, the director of the Illinois Natural History Survey described the purpose of its river program:

... [A] beginning on a comprehensive and very thoroughgoing work in the general field of the aquatic life of the Mississippi Valley, in all its relations, scientific and economic. The special subject which I have fixed upon as the point of direction towards which all our studies shall tend is the effect on the aquatic plant and animal life of a region produced by the periodical overflow and gradual recession of the waters of great rivers, phenomena of which the Illinois and Mississippi rivers afford excellent and strongly marked examples. (Dr. Stephen A Forbes)

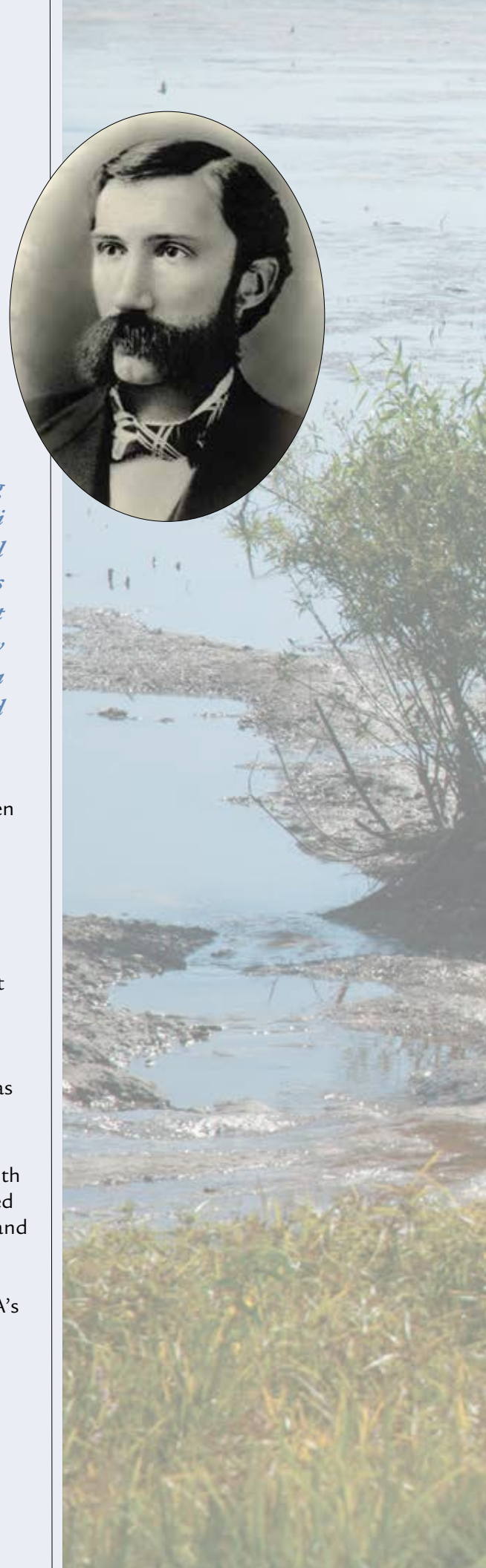
For thousands of years, humans have settled near the world's great rivers, learning to respond to their rhythms as the waters shift between overflow and recession.

The earliest civilizations—along the Nile, Indus, Yangtze, Tigris, and Euphrates rivers—practiced flood-adapted agriculture and fishing, and across the millenia humans have found other ways to live with great rivers.

The great floodplain-river ecosystems of the world continue to support phenomenal biodiversity and productivity. The Illinois floodplain, with its forests, wetlands, side branches, tributary streams and rivers, and permanent and temporary lakes and pools, is today used for dry-land agriculture. Even though the role of floodplains and seasonal floods has been structured and formalized, there are many discoveries still to be made.

Great rivers are too important to global well-being to be managed with uninformed practices, but the scientific study of large rivers has lagged far behind that of other large aquatic ecosystems. While the oceans and the Great Lakes have benefited from the establishment of specialized research centers—including the Scripps Institution of Oceanography (1910), the Woods Hole Oceanographic Institute (1930), and NOAA's Great Lakes Environmental Research Laboratory (1974) — no such institutions have been dedicated to great rivers.

PHOTO (Above) Dr. Stephen A. Forbes



NGRREC's research directly benefits the management of the Mississippi, Missouri, and Illinois rivers, and it informs management and policy decisions for other river systems throughout the world. Education and outreach based on research help inform the public and reinforce the ties of human communities to watersheds.

Human Impacts on River Systems

Human communities often rely on the presence of rivers and floodplains, and humans have greatly altered and influenced the river systems around them, sometimes to the detriment of the waterways.

These are among the challenges that face the Mississippi river system today:

- The hydrologic regime of the major rivers and their tributaries has changed dramatically since development of the lock-and-dam system on the Mississippi, Illinois, Missouri, and Ohio rivers.
 - Intensification of the agricultural system has resulted in greatly increased sediment loads in rivers and tributaries.
 - Commercial agriculture and urban sewage treatment systems have resulted in increased loading of nutrients (especially nitrogen and phosphorous) in rivers and tributaries.
 - There is an unprecedented increase in human pressure for development, water supplies, commodity transport, and recreation in the upper Mississippi basin.
 - There has been an explosion in development and floodplain conversion to human uses over the last 100 years.
 - There has been a highly significant decrease in floodplain forest cover and in forest and wetland species diversity over the past 100 years.
 - There has been a corresponding dramatic increase in invasive species in terrestrial and aquatic environments.
- There has been an increase in power energy production.

Research, both basic and applied, is required to help us manage river systems effectively, so our rivers continue as sustainable and reliable resources that support our local and regional development.

NGRREC research focuses on the following areas:

- **Invasive Species.** Particularly related to the influence of invasive Asian carp on native biota ecosystem processes, as well as testing different methods to control their spread.



- **Habitat Restoration.** Changes in river levels to allow for navigation combined with increased sediment from the watershed have degraded floodplain-river habitats such as backwater lakes and floodplain forests. Federal and state management agencies need good information to restore these habitats.
- **Long-term monitoring** – data from long-term monitoring and research programs that are focused on aquatic and terrestrial habitats within the Upper Mississippi River System make it possible to examine trends in biotic communities and critical natural resources.
- **Floodplain forest ecology** – Floodplain forests provide critical habitat for wildlife, improve riverine water quality, and provide human communities with forest-based products and recreational opportunities. Research is needed to assess the long-term viability and cost effectiveness of planting programs to increase species and structural diversity as well as to determine effective control and eradication methods for invasive species.

PHOTO ABOVE: Dr. Lyle Guyon conducting research activity at the Palisades Preserve overlooking the Mississippi river.

NGRREC Research Programs

NGRREC supports research by its own scientists and staff, including collaborative research with scientists from other institutions. The center has also provided seed grants to scientists from universities and research institutions throughout the state. The following presents an overview of some of the crucial research areas that are addressed by NGRREC scientists.

AQUATIC ECOLOGY

One of the research areas at NGRREC focuses on the invasion of non-native fish species. The Asian carp is one of the main invasive species that has caused concern since the turn of the century, as well as the bighead and silver carp, but there are at least 10 harmful species in the Great Lakes that could invade the Mississippi over the next few years. Protecting the long-term ecological health of two major ecosystems – the Mississippi River Basin and the Great Lakes – is essential to the future of the commercial and recreational activities that depend on them.

The Mississippi River has the highest diversity of fresh-water fishes (145 species) known for any region at comparable latitudes. In terms of sheer number of endemic species (found only in Mississippi or its tributaries and nowhere else in the world) there is significantly more biodiversity at risk in the Mississippi than in the Great Lakes.



In the year 2000 Asian carp populations were expanding northward in the Mississippi River and had reached the lower Illinois River in large numbers. The problem drew attention to concerns for the Great Lakes lest the carp be allowed to reach Lake Michigan. Numerous presentations around the Great Lakes raised the issue

that if allowed to colonize Lake Michigan, the Asian carp could spread to waters as far north as the lower Hudson Bay. This was based on the fact that in Asia the native range of the carp extends all the way into Siberia.

Recent assertions have downplayed the threat of the invasive Asian carp and called into question the need to investigate ways to physically separate the Great Lakes and Mississippi River basins to prevent the further spread of harmful non-native species. However, ongoing analysis reaffirms that Asian carp pose a continued risk to the Great Lakes ecology and economy that should be taken very seriously.

Still, little action has been taken to address the real need for ecological separation – the only action that is believed will effectively solve the problem for both basins. The effectiveness of the barriers in stopping the upstream movements of carp is questionable, and any electric barrier will do nothing to prevent the downstream drift of invertebrates, fish eggs and fry into the Upper Illinois River.

In addition to the Asian carp, slider turtles were exhibiting uncharacteristic reproductive patterns raising questions to those studying them. NGRREC provided a directed grant that funded senior scientist John Tucker to conduct expanded research on the red-eared slider turtle. This work indicated that longer warm climates result in turtle hatchings of three, rather than the normal two hatches per year, and the increased turtle population in turn reduces plant vegetation along the Mississippi corridor. These results are possibly linked to the broader issue of climate change.

Dr. John Chick is the team leader for the INHS research group and senior aquatic scientist for NGRREC. Chick's research team encompasses a formidable array of studies, including monitoring of exotic carp habitat and their food habits, as well as other invasive species. The group's focus emphasizes key species in both aquatic and terrestrial habitat.

The NGRREC/INHS aquatic research team has also completed a comprehensive report entitled "Ten Years of Water Quality and Fish Monitoring Data from Local River Reach (Pool 26)" and a floodplain forest survey revisiting areas surveyed after the 1993 flood.

The data yielded valuable insights into how the floodplain forest has responded since the 1993 flood and what the future forest community might look like.

PHOTO LEFT: INHS staff pull in a net during a research activity.

A key element of the INHS program is the The Long Term Resource Monitoring Program element of the Upper Mississippi River Restoration - Environmental Management Program (UMRR-EMP) Sampling involves standardized field methods coordinated with five other LTRMP field stations. This program is the result of a partnership between the U.S. Army Corps of Engineers, the U.S.G. S., and the five Upper Mississippi River states (Minnesota, Wisconsin, Iowa, Illinois and Missouri). Monitoring data are being used to detect and explain long-term trends in river-floodplain natural resources, to investigate the effects of commercial navigation, and to increase understanding of the ecology and management of large river-floodplain ecosystems.

TERRESTRIAL ECOLOGY

Dr. Lyle Guyon joined NGRREC in 2005 to implement the terrestrial ecology program with a focus on the relationships between vegetation communities and environmental characteristics (such as hydrology and soils) of big river floodplains in the Upper Mississippi River System (UMRS). Dr. Guyon's research encompasses floodplain and watersheds feeding the major river system and integrates with aquatic and human research and related policy concerns.

NGRREC established a network of permanent vegetation monitoring plots in UMRS riparian and floodplain forests to assess changes in community composition and structure over time, as well as responses to major floods. These monitoring sites extend from southern Illinois to Minnesota. Much of this work was also supported by funding from the Long-Term Resource Monitoring component of the U.S. Army Corps of Engineers' Upper Mississippi River Restoration - Environmental Management Program. In 2007 NGRREC established a relationship with the Engineering Research and Development Center's Indefinite Delivery, Indefinite Quantity (IDIQ) contracts program, and in so doing extended NGRREC's reach.

The same year, NGRREC entered into an agreement with Southern University and A&M College at Baton Rouge, Louisiana (SUBR), that empowered the institutions to; (1) compete jointly for a wide range of grants and contracts, (2) have access to a greater range of scientists, (3) formalize student and researcher exchange programs, and perhaps most importantly, (4) cover the entire length of the Mississippi River for research and education.

The first offshoot of this agreement was a joint

project at the Middle Mississippi River National Wildlife Refuge involving the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, SUBR and NGRREC. The team conducted a comprehensive vegetation survey of the Wilkinson Island Division of the Refuge and used the information to update a suite of corresponding GIS land cover maps. The vegetation survey detailed the composition and structure of floodplain forest and wetland communities at Wilkinson Island, and documented the extent of problems associated with invasive plant species.

In 2009-2010, NGRREC partnered with SUBR to conduct a forest resource inventory on approximately 23,000 acres of federal fee-title lands under the jurisdiction of the U.S. Army Corps of Engineers, St. Louis District Rivers Project Office (RPO). The acquisition of this data had been identified as a long standing, backlogged need by the RPO, and it provided land managers with the site and stand specific information on diversity, forest health, structure and invasive species needed to make sound management decisions and plans.

In 2010 L&C and NGRREC became members of the Great Rivers Cooperative Ecosystem Studies Unit (CESU). The CESU is part of a national network of cooperative ecosystem studies units focusing on providing partners in the network high-quality science, usable knowledge for resource managers, responsive technical assistance, continuing education, and cost-effective research programs, and is comprised of 21 universities and/or institutions and eight federal partners in the geographic area of the upper and middle Mississippi Valley.

The first project under the terms of the CESU was initiated in 2011, and involves a four-year study of Japanese hops management and control methods funded by a cooperative agreement with the corps RPO. Japanese hops (*Humulus japonicus*) is an aggressively invasive vine species that is becoming ever more prevalent throughout the Upper Mississippi River System (UMRS). The primary objectives of this project are to evaluate the viability and cost-effectiveness of chemical and cultural treatment options to control Japanese hops and re-establish floodplain forest in the UMRS.

NGRREC's terrestrial ecology program began working on a series of cooperative agreements with the Natural Resource Conservation Service (NRCS) in 2010, providing conservation program participants with technical assistance in support of the Conservation

Reserve Program, the Wetland Reserve Program, the Environmental Quality Incentives Programs, and the Emergency Watershed Protection Program. Technical assistance specifically includes conservation planning, practice design, practice implementation, practice checkout, annual contract review, and GIS data development and analysis.

During this time period, NGRREC participated in the development of the Upper Mississippi River Systemic Forest Stewardship Plan in collaboration with the Corps of Engineers and other partner agencies.

The plan provides a framework for coordinated management at the system level to ensure the long term sustainability of terrestrial communities of the UMRS floodplain. Dr. Guyon is listed as the lead author for this work, which was finalized and released to the public in August, 2012.

NGRREC and the RPO initiated another CESU project in 2012, to conduct an additional forest inventory on approximately 4,000 acres of RPO fee-title lands, and to begin working on summarizing and integrating floodplain forest resource data into spatially referenced GIS data products.

The terrestrial ecology program has also been involved in site-specific research being conducted at Maple Island, a 450-acre forested island directly across the river from the Confluence Field Station managed by the Corps' RPO and licensed to NGRREC for ecological research. NGRREC is also directly involved with management and ecological restoration activities at the Palisades Nature Preserve, a 430-acre site on the limestone bluffs overlooking the confluence of the Mississippi and Illinois Rivers owned by the L&C Foundation and co-managed with the Great Rivers Land Trust.

In 2012, NGRREC initiated management and research activities at Coon Island, a 170-acre forested river island in Pool 25 that was also recently donated to the L&C Foundation by Alton attorney John Simmons.

The primary means for expanding NGRREC's terrestrial research program continues to be networking and scientific collaboration.

HUMAN DIMENSIONS

Understanding human interactions in large river systems is key to effective policy for sustainable management. Although the NGRREC human dimensions research program has not grown as quickly as the aquatic and terrestrial work, there is continuing interest in building this key research area.

NGRREC is planning a comprehensive research program addressing the impacts of watershed land-use practices and development within the ecosystem. Integral to the center's goals are studies of long-term interaction between humans and the environment, human demands on the river and its watersheds, and the manner in which humans impact and are impacted by the floodplain species. Center research will also include ramifications of extreme weather events and the effects of climate change on these unique national resources.

GREAT RIVERS ECOLOGICAL OBSERVATORY NETWORK
NGRREC affiliates with INHS have been collecting water quality and fish data on the UMRS for the LTRMP element of the Upper Mississippi River Restoration Environmental Management Program for over 15 years. Administered by the US Geological Survey and funded by the US Army Corps of Engineers, the LTRMP is a partnership of four federal agencies and five state agencies. NGRREC is one of seven research groups collecting and analyzing data for this important program.

NGRREC is expanding these monitoring and research activities into new locations on the Mississippi, Illinois, and Missouri rivers, and extending research and monitoring to the terrestrial habitats of these great rivers. Scientists at NGRREC are working to create a network of monitoring buoys capable of real-time, continuous collection of water quality and phytoplankton data. This effort will begin on the Mississippi, Missouri, and Illinois rivers, with plans to expand to other great rivers throughout the world, creating a Great Rivers Ecological Observatory Network (GREON).

FACULTY FELLOWS

NGRREC leaders have encouraged and facilitated numerous faculty lead grant submissions and related discussions about future NGRREC collaborations, hence the development of a NGRREC Faculty Fellows program.

The objectives of the Faculty Fellows Program is to encourage research and grant-writing activity by cross-campus faculty teams; ramp up awareness and interest; and eventual ongoing involvement by faculty in NGRREC opportunities. Eight faculty members representing many of the most relevant units on the University of Illinois campus were selected in the first year to reflect the priority disciplinary/scientific strengths that can help move NGRREC toward distinction.



IMMERSION IN THE LANDSCAPE

For many NGRREC interns, their hands-on summer experience opens their eyes to new career opportunities and personal possibilities. Molly Spacapan's work at the Illinois River Biological Station in Havana, Illinois, started her on the path to graduate school.

"I'm not sure I would have truly known my career goals had I not experienced NGRREC," Molly said. "It's hard to sit in a classroom behind brick walls and think about natural resources and contemplate what you want to do. It can become a whole different story when you immerse yourself in a landscape."

For her internship, Molly worked on a project that explored the human dimensions of river usage following the invasion of Asian carp to the Illinois River. She was so interested in the work that she applied for a grant from the Illinois Chapter of the American Fisheries Society, which allowed her to continue her research the following summer and present her findings to the Illinois Lake Management Association.

Molly believes it's important for researchers to share their knowledge with the public. "If it matters enough that you are studying it, then you should feel compelled to share with others by getting [the research] published or presenting it."

In her graduate work in NRES at the University of Illinois, Molly's focus is the relationship between people and coyotes in urban areas. While she has moved on from Asian carp to a different species, she is continuing to study the human dimensions aspect of natural



resources, exploring the complex interactions between people and wildlife. Things just started happening. Doors started opening—or maybe I just didn't know the doors were there before—but either way it worked out well."

Greg Sass, Molly's supervisor in her NGRREC internship, finds that internships often are influential in helping students develop career goals. He praised Molly's focus, dedication, and work ethic as allowing her to make the most of the internship experience.

"I foresee Molly becoming a leader in the human dimensions of natural resources," Sass said. "Her progression was fostered by the internship opportunities provided by the National Great Rivers Research and Education Center, and I am confident that many other interns benefit in similar ways."

PHOTOS: (Top) Interns conducting river sampling (Above) Molly Spacapan

Moving Beyond the Classroom:

NGRREC INTERNSHIPS

The concept of an internship program was born of Dr. Rolfe's experience as head of NRES, where he observed the benefit to students of practical fieldwork in the natural resources. Dr. Chapman had similar experiences across his career, and together they envisioned a comparable field study for undergraduate students in the Alton area, with a focus on river floodplain ecosystems. The initial concept was to offer two-week camp experiences twice or three times per summer, because of the excellent access to river systems and natural environments.

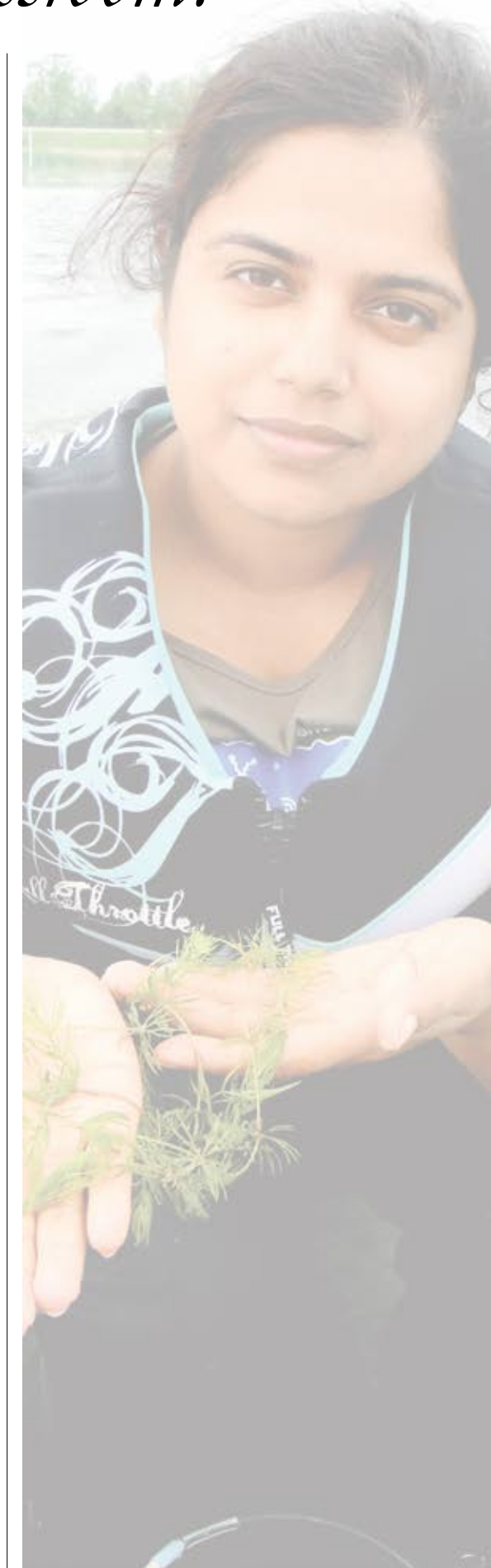
In 2002, John Edgington, a U of I NRES forestry research specialist, developed a two-week summer field course. Later that year, a more formal internship program was approved; students from U of I and L&C would work closely with an advisor and receive a stipend of \$4,000. Advisors would receive up to \$2,000 for materials and supplies. The first internship program was coordinated by Karyn McDermaid in 2003, and has been coordinated since 2004 by Bill Kruidenier and Crystal Bartanen. The first year, 12 students worked with advisors from the U of I, University of Illinois Extension and L&C. The program has expanded every year since, both in the number of applications received and institutions hosting interns. Since inception, NGRREC has successfully placed some 250 interns from 15 states, including Arizona, California, Hawaii, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Mississippi, Missouri, New Jersey, Oklahoma, Tennessee, and Wisconsin, as well as other countries including China, India, Iran and Ireland. Students from 42 institutions have participated as interns, and 31 organizations have provided advisors.

NGRREC interns gain valuable hands-on experiences not available in a classroom, interacting with environmental educators, policy makers, and scientists and learning techniques for sampling and evaluating data. A number of interns have published their work.

Internships help students expand their horizons and often influence them to pursue academic or career paths in the natural sciences. Some interns have been offered employment as a result of an internship, and several have earned positions of leadership.



Figure 1: Represents states interns are from (areas not indicated include: CHINA, Hawaii, INDIA, IRELAND and IRAN)



International Outreach

Scientists from NGRREC have also engaged with colleagues in other parts of the world to exchange knowledge and work on joint projects, including collaboration with researchers from Cambodia, China, Columbia, India, Laos, the Mekong River Commission, Thailand and Viet Nam.



Dr. Rip Sparks is credited with developing NGRREC's international connections during the center's early years. In a trip sponsored by the U.S. State Department, Sparks delivered a keynote address at the International Conference on Integrated River Basin Management in Kozhikode, India in 2003 on the topic of water resources issues common to the U.S. and India. The same year Sparks delivered a keynote address on river-floodplain interactions and integration of rehabilitation with river management at the International Society for River Research and Applications in Wageningen, Netherlands. In April of 2008 NGRREC partnered with The Nature Conservancy and USACE to host a delegation of engineers from the Cormagdalena, an organization that is responsible for navigation on the Magdalena River in Columbia, South America. The delegates visited the confluence region and participated in a series of meetings with scientists and policy makers to discuss issues related to river management for ecosystem health and human uses such as environmental flows, floodplain management, navigation, and sediment management. The meeting concluded with a session that aimed to summarize key points from presentations and facilitate a work plan.

Collaborations with India

An Indo-U.S. workshop in 2010 on sedimentation, erosion, flooding, and ecological health of rivers held at the Indian Statistical Institute in Kalkota brought together scientists, engineers, and managers from India with those working on the Upper Mississippi and Illinois River Basins in the U.S. The principal investigators of the workshop were Bijoy S. Mazumder of the Indian Statistical Institute and Nani G. Bhowmik of the University of Illinois. Mazumder, who is a professor in the Physics and Applied Mathematics unit at the Indian Statistical Institute, directs the River Mechanics Lab, where the process of erosion and sedimentation is observed and measured in instrumented flumes with glass sides.

In August, 2011, Dr. Sparks once more with Drs. Mazumder and Bhowmik. These meetings resulted in the pursuit of a joint research effort between India and the U.S. on river flooding, erosion, sedimentation and river health, which are considered major problems of large rivers. Several steps have been taken to advance cooperative work on these issues.

Chinese Collaboration

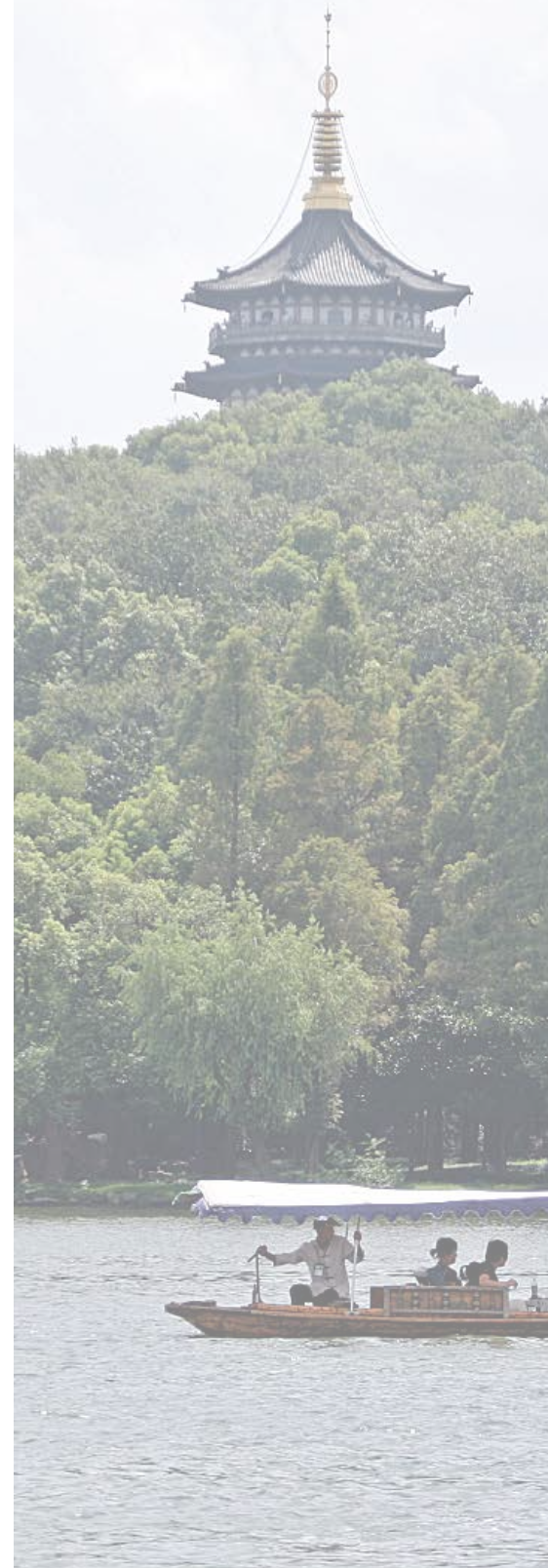
NGRREC scientists are also engaged in collaboration with researchers and projects in China. Dr. Sparks and Dr. John Chick were instrumental in developing relations with Chinese scientists studying the Yangtze River. At the invitation of The Nature Conservancy's Great Rivers Program, the U.S.G.S. and the Yangtze Water Resources Commission, Chick and Sparks travelled to China in May 2008. They formed part of an eight-member U.S. scientific team to share experiences with Chinese river managers and scientists from two universities and six government agencies. Like the Mississippi, China's rivers are working rivers and face similar challenges. The Chinese struggle with how to manage the important commercial uses of rivers (hydroelectric power, water supply, navigation, floodplain agriculture and tourism) while maintaining biodiversity and other environmental benefits, for example, through the reduction of flood peaks by wetlands and floodways.

Chick shared new evidence and ideas about the production of plankton in rivers - a subject of great interest in China where nuisance algal blooms have forced water intakes to be shut down temporarily in some areas. Constraints on river and floodplain restoration are much greater in China than in the U.S. owing to the greater population density and the need to produce food on virtually all arable land, even floodplains. Despite these constraints, the Chinese are restoring floodplain lakes, developing ways to protect property and lives while using parts of the floodplain to convey major floods. They are also considering a native fish reserve upstream from the Three Gorges Dam, the world's largest hydroelectric project. In addition, important inland fisheries in China depend on fishes that consume plankton, including the same Asian carp species that is currently invading the Mississippi River and its tributaries.

Officials in the Ministry of Water Resources in Beijing were particularly interested in Sparks' integrated analysis of the hydrological, ecological, and economic consequences of The Nature Conservancy's Emiquon Project on the Illinois River. The Emiquon site had once been one of the most biologically productive floodplain lakes in the entire Illinois Valley, but was drained, leveed, and converted to row crop agriculture. Now it is being restored to generate jobs and economic output as a center for outdoor recreation and ecotourism than as farmland.

While visiting China, Chick and Sparks met a number of scientists involved with water quality and fisheries along the Yangtze River. While the overall goal was to establish a network of scientists who study great rivers in a similar fashion for comparable data study, individual members of the group observed different areas and techniques relating to their own field of study. As a result of NGRREC's visit to China the previous year, a delegation of four Chinese scientists visited the U.S. for a tour of the NGRREC operations in 2009. The scientists came to see how the Long-term Resources Monitoring Program of the U.S. Geological Survey operates, observe data collection, and participate in a practicum to learn these techniques and observe similarities and difference between the river basins

PHOTOS: Drs. Chick and Sparks were among the participants in an exchange among scientists working on the Yangtze and Mississippi rivers.





Spreading the Word:

ENVIRONMENTAL EDUCATION

Providing information regarding large rivers and watersheds is a key element of NGRREC's mission. For river science to influence river policy and management, public knowledge and commitment need to grow.

Youth Education

NGRREC began its education program by focusing primarily on children and youth, joining with partners in the region to reach thousands of young people in both formal and nonformal contexts. Expansion to include education and outreach for adults is also underway.

One of the most successful activities for younger students is the annual Water Festival, first held in 2002 and celebrated its 10th successful year in 2012. The festival reaches hundreds of children and schoolteachers through an all-day teacher workshop that includes free curriculum materials and access to river scientists, followed by a day of outdoor experiential learning for students.

The festival was developed by L&C faculty member and environmental educator Dr. Marvin Mondy, whose background in aquatics and water quality monitoring equipped him to create programs for elementary students. When Dr. Mondy retired in 2004, Jessica Pascoe was hired as NGRREC's first environmental educator.

Festival activities expanded to include a workshop for fifth-grade teachers, who were trained in stream monitoring by NGRREC's RiverWatch coordinator. Participating teachers received training manuals, field guides, water quality test kits, and curriculum to use in their own classrooms.

In 2006, Pascoe developed a curriculum to address environmental conflict resolution. The curriculum is based on the Illinois Learning Standards and the North American Association for Environmental Education Guidelines for Excellence for grades 6 to 8.



The same year, NGRREC used resources from the Harvard Negotiation Project to equip high school students and teachers with interest-based negotiation skills. Students learned to identify and role-play the differing interests of the parties involved in a significant regional environmental issue.

In collaboration with L&C's director of continuing education, NGRREC developed an offering for L&C's College for Kids summer program.

The first Wings of Spring Confluence Birding Festival, which became an annual event, was held in 2006 at the Riverlands Migratory Bird Sanctuary in West Alton. NGRREC partnered with L&C, the Corps of Engineers, the Illinois Department of Natural Resources, the Alton Convention and Visitors Bureau, the U.S. Fish and Wildlife Service, and the Sierra Club to plan and host the public event. An education day for fourth graders preceded the festival, with NGRREC taking a lead role in sharing the importance of rivers as migratory flyways for birds.

Another successful event was "H2Ohhh!," a one-week program that introduced fifth graders to the unique properties of water and demonstrated the many connections between people, water, and land.

In 2007 RiverWatch implemented the Piasa Creek Watershed Education Team Project. Ten schools participated in the program, which provided middle



and high school students with a hands-on, field-based opportunity to learn about water quality and stream ecology by monitoring a local stream.

The same year, NGRREC worked with the Prairie Research Network, Southern Illinois University Edwardsville, and the Sierra Club to develop the Upper Mississippi River High School Symposium. A committee of representatives from each organization developed a field trip curriculum on Upper Mississippi River environmental issues such as sedimentation, invasive Asian carp, and floodplain reconnection. Two high school classes were then brought together for a one-day field trip, during which students were intermingled and provided a case study about a single Mississippi River issue. They were tasked with presenting ideas for solutions to the issue at the end of the day. Local river specialists with expertise in the specific case studies provided input and feedback to the student groups throughout the field day. The symposium continues to reach area high school students each year for a day of critical thinking and cooperative problem-solving.

Also in 2007, L&C received a USDA distance learning grant for video teleconferencing equipment to serve rural Illinois communities.

NGRREC was tasked with seeking a partnership to link Illinois elementary school students with other students across the country using this technology. RiverXchange was the resulting project of the 2008 Southwestern Illinois Water Festival (put on by NGRREC and L&C) and Children's Water Festivals and Outreach Program

in central New Mexico. NGRREC facilitated watershed learning sessions with two schools in Illinois and experiential environmental education in New Mexico facilitated sessions with the middle school class there. Both organizations helped students connect by teleconference, and a similar shared curriculum was developed by the partnership. The classes in New Mexico and Illinois met three times during the school year to exchange information about their respective rivers. Coordinators in both states worked with teachers to conduct classroom activities and prepare session presentations (correlated to state learning standards). Teleconferencing sessions were combined with field trips, hands-on classroom activities, artwork, journaling, and letter writing.

After this successful pilot, NGRREC decided to move to a Mississippi River Basin model and to expand the program within this large, single watershed. Additionally, NGRREC developed the program further for high school students, providing them with valuable career skills and training in the process of a systems learning approach to the Mississippi River Basin.

Green Education

NGRREC has become a champion for sustainability in arenas beyond river education for area youth. It has inspired the administration of Lewis and Clark Community College, for example, to think, design, build, and operate differently. The school adopted a new motto rooted in sustainability—"Think Green. Live Green."—and in 2008 joined three other schools to create the Illinois Community College Sustainability Network and establish a Sustainability Center on the L&C campus. The network focuses on greening individual campuses, providing physical space to share best practices in sustainability with the community, and creating courses to prepare a workforce for the growing green economy.

NGRREC's Confluence Field Station, the area's first LEED-certified building, is itself a premiere model of green design and construction. (The building's green features are detailed starting on page 22.) Visitors to the facility are shown how to minimize environmental impacts in their own homes and businesses.

Adopting a sustainability focus for environmental education has shaped the scope of program delivery. Programs such as invited sessions for Girls Engaged in Math and Science (GEMS) have included exercises on the complexities and importance of making more

sustainable personal decisions. Education staff also present field trip programs for schools visiting the field station focusing on energy topics and green roof construction. One year the annual Water Festival was expanded into the Water and Energy Festival, with the addition of experiential learning stations like wind turbines and energy efficiency along with proven favorites including the stream table, canoeing, and fishing.

In 2009 NGRREC worked with Alton High School, the Great Rivers Land Trust, and the Illinois Science and Math Academy to guide Alton students through a semester-long exercise in developing an environmental plan for a superstore being built near L&C. The company planned to reroute a stream that cut through the proposed parking lot, an action that would significantly impact the area's watershed. Teams of Alton High School students developed scientific posters describing alternative strategies that would minimize impact on the adjacent stream. They shared their suggestions with more than 10,000 visitors to the St. Louis Eco Expo hosted by the St. Louis Science Center.



PHOTO ABOVE: Marcia Lochmann, established the Sustainability Center at Lewis and Clark Community College.

NGRREC joined with the St. Louis Audubon Society and the U.S. Army Corps of Engineers in 2009 to host “Your River, Your Future: Make the Connection.” Some children dressed as news reporters to broadcast river stories to the audience, while others enjoyed the live native fishes displayed in small temporary pools. A functioning rain barrel inspired homeowners to acquire their own.

In 2010, NGRREC expanded and refocused RiverXChange into a new education program: the Mississippi River XChange (MRX). This multistate endeavor gives students an in-depth comprehension of their local Mississippi River region as well as the entire river system. Students research their local watershed, identify an issue affecting the Mississippi River, and design an innovative solution to resolve it. Field trips and service projects complement classroom instruction, directly expose students to the river, and foster a stewardship ethic.

A key feature is the interconnection among participating teachers, students, and project partners, achieved primarily through video teleconferencing that will bring together students from all reaches of the river to share their questions, inquiries, experiences, and knowledge. Such connections highlight perspectives and issues that exist on the river well beyond students’ own locales and will encourage holistic thinking. A culminating one-day summit will provide project partners, educators, and students an opportunity to share the results of their watershed stewardship projects.



NGRREC is piloting and developing MRX into a multi-state program, with a goal to create a model program that educates students about the Mississippi River Basin, from the headwaters to the Gulf of Mexico and will ultimately allow partners to expand and deliver regionally while allowing also for adaptation by additional organizations for use within other large river systems. The center continues to partner with organizations located along the river that possess the capacity to develop and deliver the MRX program. The Confluence Field Station serves as the central site along the river and the primary administrative unit for the program.

In May 2012, NGRREC became the Illinois host for Project Water Education for Teachers (Project WET). Project WET aims to provide educators throughout the U.S. with resources and training in a variety of water related curricula. As the statewide host, our environmental educator and Project WET coordinator provides annual facilitator workshops to train individuals who will commit to provide further training for educators throughout Illinois. Through educator and facilitator workshops, formal and non-formal educators are able to access the Project WET curriculum and activity guide, as well as other water resource materials. The Nature Institute in Godfrey, Illinois, is also working with NGRREC to provide additional support and training, ensuring that educators throughout Illinois are aware of, and have access to, these resources and curricula.

PHOTO LEFT: Jessica Pascoe with elementary school aged students and PHOTO ABOVE: Olivera Bojic leading an elementary school environmental education program.

Expanding our Reach

With research and education programs in place, NGRREC was ready to address the third area of focus: outreach and public engagement. Findings from the research staff are incorporated into NGRREC’s outreach programs to increase public understanding of large rivers and their watersheds, including human activities in these settings.

NGRREC also provides a forum for scholars and interested parties to share research and collaborate on solving river-related issues during public symposia. The following provides an overview of symposia hosted by NGRREC over the years.

Indicators of the Health of Great Rivers symposium was held at L&C on April 15, 2004. This was NGRREC’s first national meeting, initiated by Drs. Chick and Sparks. The event put the spotlight on complex water systems and the latest techniques to evaluate the health of rivers, and it was attended by scientists from NGRREC, University of Illinois, INHS, Southern Illinois University at Carbondale (SIUC), the University of Louisville, and the South Dakota Center for Biocomplexity Studies.

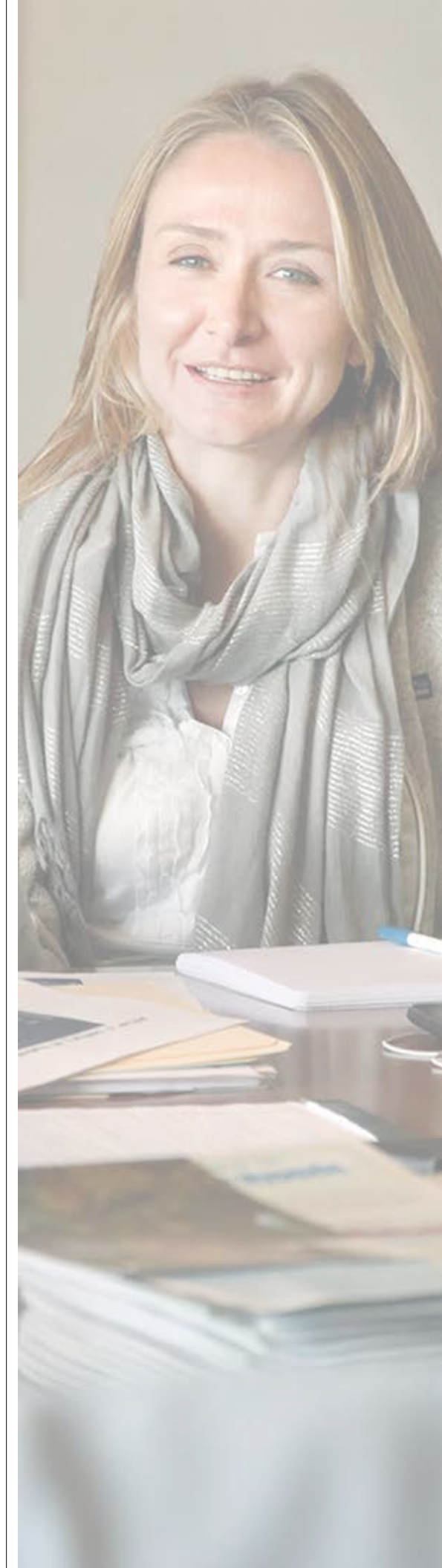
A Confluence of Interests: Nature and Tourism in River Cities and Rural Areas conference was held at L&C on April 22-23, 2005. Ted Eubanks, President of Fermata, Inc. and a nationally known consultant in development of eco-tourism gave the keynote address, “What Can Nature-Based and Culture-Based Tourism Do for Your Community?” Afternoon sessions included Planning Tools for Communities, How to Turn Culture and Nature into a Business, and How to Assess and Profile Your Community.

Lessons from the Deep History & Recent History of the Missouri, Illinois, and Mississippi River. Nationally renowned scientists used geological, archeological, and historical records to examine patterns in floods, droughts, and other manifestations of climate change. Speakers discussed the effects of prehistoric and historical changes on human societies and the contributions of humans to such changes. An improved understanding of the interactions between humans and climate could help reduce adverse effects of changes that humans can influence and lead to better preparation for impacts that are beyond human control.

Dr. Sparks and Dr. Jane Buikstra of the Center for American Archeology co-organized two sessions at the International Conference on Rivers & Civilization: Multidisciplinary Perspectives on Major River Basins, which was held on June 28, 2006 in La Crosse, Wisconsin.

The Illinois’ Cache River: Advancing the Restoration of an Internationally Significant Wetland Ecosystem conference was held August 10-12, 2006 at John A. Logan Community College in Carterville, Illinois, and co-organized by NGRREC and Cache River Wetlands Joint Venture Partnership.

PHOTO RIGHT: Alexandra Cousteau, keynote speaker for the Visions of a Sustainable Mississippi River conference in 2009.



The Cache River in southern Illinois is one of just 23 designated Wetlands of International Significance in the U.S., yet it was nearly lost to timber cutting and drainage for agricultural development in the 1970s. The first day of the conference reviewed progress in restoring a 60,000-acre corridor along 50 miles of the river and described the economic impacts on local communities. A legislators' luncheon acknowledged elected officials who assisted with the recovery effort. Experts and members of the public contributed to development of future restoration strategies in a roundtable discussion. The conference concluded with tours of the Cache River conducted by local experts.

NGRREC's sixth symposium, **Visions of a Sustainable Mississippi River: The Confluence of Ecological, Economic, and Cultural Values** conference was held August 6 - 8, 2009 in Collinsville, Illinois. The event brought together over 200 river stakeholders to discuss new strategies for achieving ecological and economic sustainability of the Mississippi River. Representative Costello also hosted a policy forum at Lewis and Clark Community College during the three-day public conference. Congressional leaders listened to policy concerns about the Mississippi River presented by representatives of several agencies. Recommendations on the management of the river were prepared during the conference and delivered to a panel of experts following the event.

The **Bottomland Ecosystem Restoration Management** conference held from March 8 - 10, 2011 was well attended by representatives from state and federal agencies, non-governmental organizations, academic institutions, and additional stakeholders from the Upper Mississippi River System as well as the Lower Mississippi Alluvial Valley. The conference attracted 175 participants from 17 states, who made the journey to Collinsville, Illinois, for two full days of presentations and discussion sessions. This event was the seventh in a series of river conferences co-hosted by NGRREC with the U.S. Forest Service, Northeastern Region, State and Private Forests.

THE SCIENCE ADVISORY COMMITTEE

NGRREC and Illinois Lieutenant Governor Sheila Simon's office entered into an agreement in 2011 to formalize the center's support of the Lieutenant Governor's Science Advisory Committee (SAC). NGRREC agreed to fund travel and provide administrative support for members of the SAC as they make efforts to further address scientific issues related to Illinois rivers. In a press release announcing the agreement, NGRREC chair and L&C president Dale

Chapman stated, "We are pleased that NGRREC is hosting the Science Advisory Committee. NGRREC is focused on developing sustainable practices and policies that will protect the great rivers of the world and Illinois' waterways, and we are looking forward to engaging other scientists in our mission."

First established in 1999, the SAC consists of unpaid volunteer members; it is currently chaired by professor emeritus Dr. Nani Bhowmik. The group, which brings together experts from academia and the private sector, provides background information to the Lieutenant Governor's office on issues such as invasive species and other potential threats to Illinois' rivers. SAC serves as the scientific and technical arm of the three River Coordinating Councils that are chaired by the Lieutenant Governor; these councils are comprised of citizens and representatives from not-for-profit organizations and state and federal agencies. Together, the SAC and the river councils work to find cost-effective ways to improve the ecological health of the Illinois, Mississippi, Ohio, and Wabash rivers.

The SAC has previously published research illustrating the importance of preventing Asian carp and other invasive species from moving between the Great Lakes and the Illinois River, which helped secure full federal funding for two electric barriers in the Chicago Sanitary and Ship Canal that serve as a barricade between the Mississippi River and Lake Michigan.

The SAC is also exploring other aspects of water and environmental management and change. Currently, the most pressing issue is developing an adaptive management policy for the state.

COLLABORATIVE HUB FOR INTEGRATED SOIL, WATER, AND WILDLIFE CONSERVATION INITIATIVES

With funding from the Illinois Department of Natural Resources (IDNR) and the National Fish and Wildlife Foundation (NFWF), NGRREC and partners have formed a collaborative hub with the capacity to assist private landholders in addressing soil, water, and wildlife conservation goals through Farm Bill conservation programs targeting watersheds.

In this context NGRREC and partners are developing a "Land Grant" approach that fosters learning, discovery, work force development, and engagement to sustain agriculture and critical ecosystem functions in watersheds. This approach will ultimately help improve Mississippi River Basin Initiative (MRBI) and related farm conservation programs by using adaptive management principles, sound science, and approaches that are responsive to site-specific conditions.

Keeping Track: RiverWatch

The Illinois RiverWatch Network was created to monitor the health of rivers throughout the state. The extensive program relies on a large network of volunteer "citizen scientists" to gather data about water and ecology conditions of rivers. RiverWatch was managed by the Illinois Department of Natural Resources from 1995 to 2004, but in 2005 it was taken on by NGRREC. The program has expanded significantly under NGRREC's leadership; by 2011, 89 new volunteers had been trained and 35 were attending refresher workshops.

RiverWatch sampling has proven to be a fun and informative activity for many community groups throughout Illinois, such as the Upper Sangamon River Conservancy. Such groups, which number in the hundreds, provide a local face for the program and a pool of volunteers who might otherwise be unreachable. Community groups also help to ensure consistency of sampling over multiple years, which is of great value when scientists are looking for trends in the data. A group is often much more capable than an individual of sampling a site over the course of time.

High schools and colleges also contribute to the RiverWatch network. Teachers bring sampling and macroinvertebrate identification into their classrooms as a way of introducing concepts of stream ecology and water quality. RiverWatch also integrates with similar programs for younger students.

Partners such as the Prairie Rivers Network, the Illinois Department of Natural Resources, Friends of the Fox River, the Sierra Club, nature preserves and other state entities, and schools at all levels assist by providing resources, expertise, and ways to communicate the RiverWatch message to the public. Some of these partners keep RiverWatch equipment on hand for use by volunteers. Others, such as Benedictine University in Springfield, allow RiverWatch citizen scientists free access to microscopes to identify the macroinvertebrates they have collected. The Illinois Natural History Survey analyzes the data collected by volunteers for yearly reports, ensuring that the data is accurate, reliable, and usable.

In addition to its citizen scientists, RiverWatch relies on a knowledgeable and impassioned staff of volunteer trainers. These trainers successfully tie together the activities of northeastern Illinois volunteers with those of their downstate counterparts.

Generous financial support from the McKnight Foundation and the Illinois Water Resources Center, among others, has made it possible to purchase new monitoring equipment, support an expanded network of volunteers, solidify relationships with existing partners, and forge new partnerships. The McKnight Foundation grant facilitated work on a citizen scientist database created by the Illinois Natural History Survey.



In 2011 RiverWatch published the Aquatic Macroinvertebrates of Illinois: A Supplement for the Illinois RiverWatch Program. Its photographs, generalized taxa descriptions, and details on stream fauna make it valuable to volunteers throughout the state.

RiverWatch representatives give presentations throughout the state to recruit volunteers and expose more of the public to the program. Anyone interested can follow the latest RiverWatch news in newsletters distributed quarterly and posted on the NGRREC website.

Maintaining a cohesive statewide network is challenging, and in an effort to better coordinate groups and volunteers, NGRREC plans to establish regional offices strategically around the state. These offices will serve as hubs for RiverWatch events and activities in each region.

RiverWatch will also explore ways that the program's data sets can be used by environmental and other nonprofit groups and government agencies at all levels to inform the policy process.

Currently, agencies like Illinois EPA cannot use the data collected by volunteers to assess the quality of Illinois streams because the collection methods lack sufficient scientific rigor. NGRREC plans to make RiverWatch data more relevant to governmental agencies through carefully scrutinizing sampling methods and looking for potential biases. Increasingly, many researchers are finding that while "citizen science" may include some inherent biases and weaknesses, volunteer data can provide extremely valuable information.



PHOTO ABOVE: Olivera Bojic teaching elementary-level students how to identify macroinvertebrates.

How it all adds up

ADDED BENEFITS FROM NGRREC PARTNERSHIP

NGRREC was created as a unique partnership among three institutions, driven by visionaries from different backgrounds coming together for a common goal. When Dr. Rolfe and Dr. Chapman first envisioned a research and education center that focused on great rivers, they looked to other comparable institutions, such as the Woods Hole and the Scripps Oceanic Institute, which focus on great bodies of water. However, Rolfe and Chapman found that no organizations were devoted to the study of great rivers. Considering that the Mississippi River watershed is the third largest in the world, and knowing that research informs policy, Rolfe and Chapman embarked on a path to create such a place. They quickly realized that it would take a huge entrepreneurial push, support from many key players, and close cooperation between groups that each would bring unique strengths to the equation.

L&C became the lead institution in providing the capital and financial assistance needed on an annual basis, in addition to federal funding, while the University of Illinois provided the research strength.

The cooperation among the institutions allowed each one to contribute their individual strengths and provide additional benefits. It also initiated a type of collaboration that can be transferred to other contexts and projects that may become a model for how universities and community colleges draw upon the strength of each organization for the benefit of all.

NGRREC may also lead the way for a new model of collaboration between community colleges and land-grant extension services, providing new ways to reach out and engage with local communities. For example, Chapman has suggested that problems such as 'food deserts' in rural America as well as lack of dentists and access to transportation are issues that L&C could address in collaboration with the Extension service. One tangible example of how L&C has already begun to address such issues is a mobile nurse-managed clinic that is driven to rural areas to provide dental care, wellness exams, women's exams, and preschool screenings for children. Chapman points out that this kind of public engagement is not traditional for community colleges, and he credits the land-grant relationship in partnering with the University of Illinois with the mindset that allowed this to be accomplished. This collaborative relationship has allowed L&C to compete for grants at a national level, which they would not have been able to do without the benefit of working alongside the University of Illinois on many research and educational programs and projects.

Dr. Chapman believes that the land-grant/community college model will become a new educational force. His goal for L&C is to be designated as a research community college and a land-grant community college.





The University of Illinois has led the development of this new model through its partnership with L&C as the institutions work jointly to seek funding and share faculty, graduate students, laboratories, and equipment.

The collaboration also provides unique benefits to the Illinois, which points to a possible expansion of the model to include other community colleges across the state. Working with community colleges provides Illinois researchers with new ways to be engaged with local and regional community interests and needs, and it allows for a greater flow of information from decision makers at the local, state, and federal levels.

The development of land-grant colleges and universities in the late 19th century contributed greatly to the success of the higher education system in the United States. One of the most important attributes of the land grant system at inception, and for many decades thereafter, was public accessibility. However, as tuition escalates at land-grant universities, the community college system has become an important alternative for individuals seeking two-and four-year degrees and work-force training.

Because of their ties to the local and regional areas, community colleges often excel in providing education and training for local industries and professions. They also provide services such as job placement and certification for fields that require state or national examination or licensing. Partnerships between community colleges, land-grant universities and extension services could strengthen such programs and offer more opportunities to serve the needs of local communities.

Future Expansion Opportunities

As one of the three founding institutions of NGRREC, the U of I continues the commitment to the center's strong core research and education staff and programs. A memorandum of understanding (MOU) as outlined by the Board of Trustees at U of I was executed in August of 2011, to formalize the partnership with L&C to strengthen and develop new programs focused on large rivers, watersheds, and human interactions with the watersheds.

Five top research priorities were established in the MOU. These topics invite researchers at the University of Illinois to participate in collaborative research projects with NGRREC and partner scientists, where they have access to NGRREC's state-of-the art research facility.

The Illinois investment funds critical positions and assists with the pursuit of large, prestigious grants, such as those offered by the National Science Foundation. The MOU commits Illinois to designate NGRREC as a high priority for the pursuit of annualized state and general revenue funding, federal funding opportunities and potential corporate and foundation supporters. This provides NGRREC with the potential to create significant full-time and specialty positions, while growing its existing research, education and outreach programs and creating new ones, such as the national and international visiting scientist program, the Great Rivers Ecological Observatory Network (GREON), a challenge grant program at Illinois, a management and policy program, and clean technologies / green job training.



The National Great Rivers Research & Education Center

NGRREC wishes to thank the multi-talented and passionate staff who helped found the Center's research and educational programs, and to those who have carried the torch along the way, each in their own way making us stronger and challenging us to expand to new horizons.

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