

Conference organized by the
**National Great Rivers Research
and Education Center**, (a partnership
of Lewis and Clark Community College,
the University of Illinois, and the
Illinois Natural History Survey) and
The Nature Conservancy.



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Research & Education Center

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The Confluence of
Ecological, Economic,
and Cultural Values

August 10-13, 2009
DoubleTree Hotel
Collinsville, IL

Visions of a Sustainable Mississippi River

THE SIXTH IN A SERIES OF PUBLIC CONFERENCES ON RIVER ISSUES



Photo: ©H.Miller



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This conference brings together a diverse group of Mississippi River stakeholders, researchers, and natural resource professionals. Through conference presentations, panel discussions, and workshops, attendees will formulate policy recommendations on four topics critical to the sustainable management of the Mississippi River and the human communities that depend on it. The topics include ecosystem services and the economic value of the Mississippi River; floodplain connectivity, flood control, and the hydrologic regime; ethanol production in the Mississippi River basin; and clean water and the Mississippi River.

The conference will conclude with a Policy Forum hosted by U.S. Congressman Jerry F. Costello where policy recommendations will be presented to elected officials and agency decision makers. We are pleased you are taking part in this unique event as we work together to formulate sustainable solutions to critical issues facing the Mississippi River.



Photo: ©H.Miller

Conference presented by:

The National Great Rivers Research and Education Center (NGRREC), located at the confluence of three great North American rivers—the Mississippi, Missouri, and Illinois—is uniquely positioned to study the ecology of big rivers, the workings of the watersheds that feed them, and the ties to the river communities that use them. The center aspires to be a leader in scholarly research, education, and outreach related to the interconnectedness of large rivers, their floodplains, watersheds, and their associated communities. It is a partnership between the University of Illinois at Urbana-Champaign, the Illinois Natural History Survey, and Lewis and Clark Community College in Godfrey, Illinois.

In 2008, construction began on the center's new Confluence Field Station in Alton, Illinois, near the National Great Rivers Museum along Illinois Route 143 and adjacent to the Melvin Price Locks and Dam. The field station will be a model of green construction, with minimal environmental impact, integrated renewable energy systems, and internal recycling systems. The center is seeking LEED certification (Leadership in Energy and Environmental Design), affirming that the new facility meets USGBC (U.S. Green Building Council) standards for energy and resource efficiency and a dramatic reduction of carbon dioxide emissions from conventional levels.

With completion of the field station at Alton, big river research will advance to a higher level of sophistication. The field station represents a major step forward in protecting and preserving our great rivers. It will attract researchers and scientists worldwide and focus international attention on this region as an important center of groundbreaking research. Researchers will continue to use this and other facilities, including those of partner institutions, to gather data and conduct experiments that add to our knowledge of river systems. Conference attendees will have the opportunity to tour the facility at the Confluence Field Station Sneak Preview and Reception on the evening of August 11.

The Nature Conservancy (TNC)

The Nature Conservancy is a leading conservation organization working around the world to protect ecologically important lands and waters for nature and people. To date, its conservation efforts have protected more than 15 million acres in the United States and have helped preserve more than 102 million acres in Latin America, the Caribbean, Asia, and the Pacific.

In 2005, with the support of Caterpillar, Inc., through its Foundation, The Nature Conservancy launched the Great Rivers Partnership, an ambitious effort to guide protection of the world's greatest river systems. Together with other corporations and individuals, the partnership is advancing solutions that will help restore the health of rivers such as the Mississippi in the United States, the Yangtze in China, and the Paraguay-Parana in Brazil.

Along the Mississippi River, the Conservancy is working in teams on 30 project sites to reconnect floodplains, improve land use practices, quantify ecosystem services provided by wetlands, and advocate for policy changes that result in a healthier river for people, the economy, and the environment. The Nature Conservancy is honored to co-sponsor the 2009 Mississippi River Conference with the National Great Rivers Research & Education Center.



With a length exceeding 2000 miles, a watershed encompassing over 40% of the land area of the contiguous United States, and over 70 million people residing in its basin, the Mississippi River is America's greatest river and is critically important to the nation both as an ecosystem and transportation system. Over 60% of all U.S. grain exports are shipped on the Mississippi River and 92% of all U.S. agricultural exports are produced in its watershed. The importance of this ecosystem to the continent of North America is unrivaled. Over 135 species of fish reside in this river-floodplain ecosystem and over 60% of all North American birds use the Mississippi River as a migratory flyway.

Human communities from the ten states that border the Mississippi depend on the diverse services this ecosystem provides, including drinking water, waste disposal, commercial fisheries, recreation and ecotourism. More people visit the Upper Mississippi River for its recreational opportunities than either the Everglades or Yellowstone national parks. Sustainable management of this river to promote both ecological and economic health is an imposing challenge to our nation's decision makers. Our conference is an attempt to assist in this effort by bringing together diverse user groups with multiple perspectives, identifying points of consensus, and forming these points into workable policies that can lead to better management of the river. We have chosen to focus on four topics critical to the sustainable management of the Mississippi River:

1. Ecosystem Services and the Economic Value of the Mississippi River

The concept of ecosystem services was developed as a response to the common belief that: 1) the general public lacks a full appreciation for the dependence of society on healthy ecosystems, and 2) that discussions of the value of ecosystems based on economic terms may be more readily appreciated by the public than discussions based on ecological concepts such as biodiversity or ecological integrity. Among the principal challenges in moving the ecosystem services concept forward are: 1) identifying ecosystem services that are critical to society both today and in the future, 2) developing techniques to accurately account for the economic value of these services, and 3) translating these concepts and findings into workable policies for sustainable management.

2. Floodplain Connectivity, Flood Control, and the Hydrologic Regime

Most people understand that dams pose challenges to river ecosystems by reducing longitudinal connectivity, but fewer people appreciate how critical lateral connectivity between rivers and floodplains is to ecosystems like the Mississippi River. Furthermore, the tendency for human development in floodplains leads to tradeoffs between flood protection and maintenance of floodplain connectivity. Sustainable management is further challenged by the complexity of large ecosystems like the Mississippi, where regional differences in ecosystem function and the hydrologic regime demand that policies be developed at regional, rather than systemic, scales.

3. Ethanol Production and the Mississippi River

Agriculture dominates the watershed of the Mississippi River, and increased ethanol production could significantly alter this landscape. Whereas biofuels may reduce dependence on fossil fuels and carbon emissions, the potential impacts of increased corn production on water quality should not be overlooked. Strategies to reduce the impact of biofuel production on the Mississippi River and wetland habitats throughout the floodplain and watershed need to be explored, including alternative cellulosic feedstock.

4. Clean Water and the Mississippi River – Uses and Threats

The Clean Water Act led to notable improvements in water quality for the Mississippi River and other freshwater ecosystems through control of point source pollution. Nevertheless, significant barriers to effective implementation and coordination of Clean Water Act provisions among states remain, and new threats and ecological stressors are emerging. In particular, effective control non-point source pollution and the implementation of monitoring and assessment programs are especially challenging for this multijurisdictional ecosystem.

Please let your voices be heard and work with our speakers, panelists, and facilitators, as we identify points of consensus for these four topics and work to mold these into policy recommendations and suggestions.

– Dr. John Chick



We thank all of the following individuals and organizations who contributed their time and talent to making this conference a success.

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1:30 PM
REGISTRATION
Location: Lobby

7:00 PM
WELCOME
Location: Ballroom

SPEAKERS:

Dr. Dale T. Chapman
President,
Lewis and Clark Community College

Dr. Gary Rolfe
Executive Director,
National Great Rivers Research
and Education Center

Michael Reuter
Director,
Great Rivers Partnership,
The Nature Conservancy

Dr. John Chick
Director,
Great Rivers Field Station,
Illinois Natural History/
National Great Rivers Research
and Education Center

7:30 PM
POSTER SESSION & WELCOME RECEPTION
Location: Lobby



7:00 AM
REGISTRATION AND COFFEE SOCIAL
Location: Lobby

7:50 AM
OPENING REMARKS
Location: Ballroom

8:00 AM
PRESENTATIONS AND PANEL
DISCUSSION ON TOPIC 1:
ECOSYSTEM SERVICES AND THE ECONOMIC
VALUE OF THE MISSISSIPPI RIVER
Location: Ballroom

SPEAKERS:

Dr. Steven Kraft
Chair, Department of Agribusiness,
Southern Illinois University Carbondale

Dr. Kenneth Lubinski
River Ecologist,
Upper Midwest Environmental Sciences Center,
US Geological Survey

Dr. Stephen Polasky
Fesler-Lampert Professor of Ecological/
Environmental Economics,
University of Minnesota

PANELISTS:

Mr. Robert Blocker
Vice President of Planning &
Business Development,
AEP River Operations

Dr. James Caudill
Senior Economist,
U.S. Fish and Wildlife Service

Mr. Marvin Hubbell
Long Term Resource Monitoring
Program Manager,
U.S. Army Corps of Engineers

Mr. Rob Maher
Commercial Fishing Program Manger,
Illinois Department of Natural Resources



10:00 AM
BREAK

10:10 AM
PRESENTATIONS AND PANEL
DISCUSSION ON TOPIC 2:
FLOODPLAIN CONNECTIVITY FLOOD
CONTROL AND HYDROLOGIC REGIME
Location: Ballroom

SPEAKERS:

Dr. Paul DuBow
Environmental Program Manager,
Mississippi River and Tributaries Regional
Technical Center,
US Army Corps of Engineers

Dr. Gerald Galloway
Arthur Maass, Gilbert White Visiting Scholar,
Department of Civil and
Environmental Engineering,
University of Maryland

Dr. Nicholas Pinter
Professor,
Department of Geology and Environmental
Resources and Policy Program,
Southern Illinois University Carbondale

PANELISTS:

Mr. Edward Brauer
Hydraulic Engineer,
U.S. Army Corps of Engineers

Dr. David Galat
Assistant Unit Leader-Fisheries,
Missouri Cooperative Fish & Wildlife
Research Unit

Mr. Mickey Heitmeyer
Owner,
Greenbrier Wetland Services

Mr. Todd Strole
Associate Director,
Floodplain Initiative Upper Mississippi
River Program,
The Nature Conservancy

12:00 PM
LUNCH (ON YOUR OWN)

1:15 PM
PRESENTATIONS AND PANEL
DISCUSSION ON TOPIC 3:
ETHANOL PRODUCTION
AND THE MISSISSIPPI RIVER
Location: Ballroom

SPEAKERS:

Dr. T. Jack Huggins
Upper Mississippi River Program,
The Nature Conservancy

Mr. Mike Hubbs
Director,
Ecological Sciences Division,
Natural Resources Conservation Service,
US Department of Agriculture

Dr. Silvia Secchi
Assistant Professor of Energy, Economics
and Policy,
Department of Agribusiness Economics,
Southern Illinois University Carbondale

PANELISTS:

Dr. Jeff Houser
Research Ecologist,
USGS Upper Midwest Environmental
Sciences Center

Mr. Bob McLeese
State Soil Scientist,
USDA – Natural Resource Conservation Service

Mr. Eric Schenck
Regional Biologist,
Ducks Unlimited

Ms. Anne Steckel
Director of Government Affairs,
Growth Energy

3:15 PM
BREAK

3:25 PM
PRESENTATIONS AND PANEL
DISCUSSION ON TOPIC 4:
CLEAN WATER AND THE MISSISSIPPI
RIVER – USES AND THREATS
Location: Ballroom

SPEAKERS:

Mr. William Franz
Upper Mississippi River Team Manager,
Region 5,
US Environmental Protection Agency

Dr. David Soballe
Research Biologist,
Engineer Research and Development Center,
US Army Corps of Engineers

Mr. Matt Rota
Director,
Water Resources Program,
Gulf Restoration Network

7:00 AM
COFFEE SOCIAL

8:00 AM
TOPIC 1 AND 3 WORKSHOPS

TOPIC 1: ECOSYSTEM SERVICES AND THE ECONOMIC VALUE OF THE MISSISSIPPI RIVER
Location: TBD

TOPIC 3: ETHANOL PRODUCTION AND THE MISSISSIPPI RIVER
Location: TBD

9:45 AM
BREAK

10:00 AM
TOPIC 1 AND 3 WORKSHOPS (CONTINUED)

11:30 AM
LUNCH (ON YOUR OWN)

1:00 PM
TOPIC 2 AND 4 WORKSHOPS

TOPIC 2: FLOODPLAIN CONNECTIVITY, FLOOD CONTROL AND HYDROLOGIC REGIME
Location: TBD

TOPIC 4: CLEAN WATER AND THE MISSISSIPPI RIVER: USES AND THREATS
Location: TBD

2:45 PM
BREAK

3:00 PM
TOPIC 2 AND 4 WORKSHOPS (CONTINUED)

4:30 PM
END OF WORKSHOPS 2 AND 4

5:30 PM
BUSES DEPART HOTEL
for Lewis & Clark Community College

6:00 PM
MISSISSIPPI RIVER STAKEHOLDERS' BANQUET
Location: Commons

8:00 PM
KEY NOTE ADDRESS BY ALEXANDRA COUSTEAU
Location: Hatheway Auditorium

9:00 PM
BUSES DEPART
Lewis & Clark Community College for Hotel

Keynote speaker Alexandra Cousteau is the founder of Blue Legacy International and granddaughter of the legendary Jacque-Yves Cousteau. Follow Alexandra's blog at Blue Legacy, www.alexandracousteau.org/usa



8:45 AM
BUSES DEPART HOTEL
for Lewis & Clark Community College

9:15 AM
COFFEE SOCIAL
Location: Commons (CM)

10:00 AM
POLICY FORUM INTRODUCTIONS
Location: Commons (CM)

Dr. Dale Chapman
President, Lewis and Clark Community College

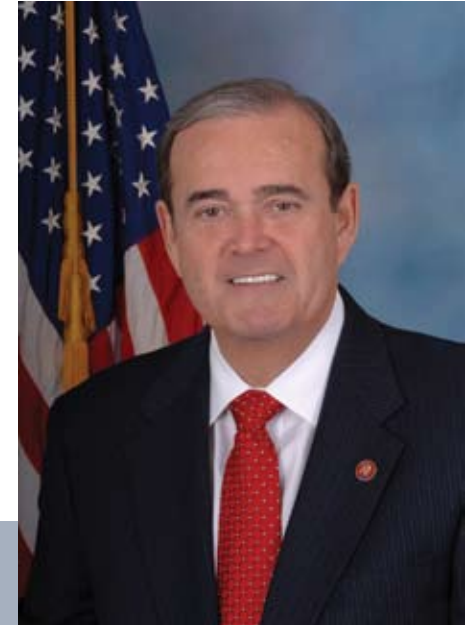
Policy Forum Host:
U.S. Congressman Jerry F. Costello

10:30 AM
POLICY FORUM: PRESENTATIONS TO ELECTED OFFICIALS AND OTHER DECISION MAKERS

12:30 PM
LUNCH
Location: Commons (CM)
GREAT RIVERS AND THE MISSISSIPPI: A GLOBAL PERSPECTIVE

1:30 PM
ADJOURN; BUSES DEPART
Lewis and Clark Community College for Hotel

U.S. Congressman Jerry F. Costello hosts the Policy Forum on Thursday, August 13



**TOPIC 1:
ECOSYSTEM SERVICES AND THE ECONOMIC VALUE OF THE MISSISSIPPI RIVER**
**Ecosystem Services and the Mississippi River:
Valuation and Policy**

Steven E. Kraft, Southern Illinois University, Carbondale, IL

Dr. Kraft is Chair of the Department of Agribusiness Economics and Co-director of the Environmental Resources and Policy Ph.D. program at Southern Illinois University Carbondale. His specialty areas are soil and water conservation policy, watershed planning, and ecosystem services. While at SIUC, he has obtained over \$3.5 million in grants from sources including NSF, USDA, Joyce Foundation, The Nature Conservancy, and Illinois Council on Food and Agricultural Research. Recent publications include *The Law and Policy of Ecosystem Services* with JB Ruhl and Chris Lant. He teaches farm management, natural and environmental economics and policy, and social perspectives on environmental issues.

ABSTRACT

In the last 15 years, the concept of ecosystem services as a policy-relevant idea has moved halting from the scientific community into the realm of public policy. The general public is unfamiliar with the concept nor does the public recognize the contributions made by ecosystem services to its overall quality of life. The Mississippi River provides an excellent site to demonstrate the range of ecosystem services a complex mixture of ecosystems such as found along the river can provide. The Mississippi River also illustrates how public policy played out across the landscape can significantly alter the quality, the mix, and the quantity of ecosystem service flows with direct and indirect implications for human welfare. The nature of these services, issues related to ecosystem service valuation, and the consideration of ecosystem services within a policy context will be the focus of the paper.


**Predictable Issues that Decision Makers Must Resolve in
Order to Apply the Concept of Ecosystem Services to the
Management of the Mississippi River?**

Ken Lubinski, U.S. Geological Survey, La Crosse, WI

Dr. Lubinski is a river ecologist at the Upper Midwest Environmental Sciences Center. He led the scientific design of the Long Term Resource Monitoring Program for the Upper Mississippi River System, authored the first conceptual model of the Upper Mississippi River, was the senior editor of "Ecological Status and Trends of the Upper Mississippi River System, 1998", and organized a 2006 workshop and science strategy on Mississippi River ecosystem services.

ABSTRACT

Dr. Lubinski is especially interested in applying scientific knowledge to help society and its representative institutions find a sustainable balance among all of the river's values and uses.

An underlying assumption supporting the recent attention to ecosystem services is that greater understanding will encourage society to place higher value on conserving our natural resources. I agree that too many people either still don't realize how dependent humans are on healthy ecosystems and that many take these dependencies for granted. I also agree that many people are persuaded to action more by economic arguments than by defenses of concepts such as biodiversity. So, in our long-term endeavors to reach economic, ecosystem, and social harmony on the river, a broad and credible understanding of its ecosystem services does seem to be pre-requisite. But, if our long-term goal is to eventually use measures of ecosystem services as decision criteria in future applied river management programs, many issues need to be resolved. Which river ecosystem services matter to us? Will the same ones matter to our children? How should these services be measured and at what scales? Once we have initial estimates of the services, what methods and rules should we use to consistently value them? Exactly what decisions and trade-offs will ecosystem services information be expected to influence? Finally, to what river management institutions should we assign the critical responsibility for gathering and effectively using this information? All of these issues require solutions that are specific to the conditions, uses, and institutions of the Mississippi River. Several projects to measure the river's ecosystem services are already underway. I'll describe some of these, use them to illustrate the above issues, and discuss how the issues relate to the other primary topics of discussion at this conference.

**TOPIC 2:
FLOODPLAIN CONNECTIVITY, FLOOD CONTROL AND HYDROLOGIC REGIME**
**Ecosystem Services: Accounting for the Value of Nature
in Decision-Making**

Stephen Polasky, University of Minnesota

Dr. Polasky holds the Fesler-Lampert Chair in Ecological/ Environmental Economics at the University of Minnesota where he has a joint appointment with the Department of Applied Economics and the Department of Ecology, Evolution and Behavior. He served as the senior staff economist for environment and resources for the President's Council of Economic Advisers in 1998-1999 and has served on committees on the value of ecosystem services for EPA's Science Advisory Board and the National Research Council. He is currently working on a book on ecosystem services in conjunction with colleagues at the Natural Capital Project.

ABSTRACT

The Mississippi River and surrounding lands provide a range of goods and services of value to people. But human actions are eroding the ability of these ecosystems to sustain these ecosystem services. Economic systems typically do not incorporate the full impact of production or consumption decisions on ecosystems. Unless we fix these systems to begin to properly account for the value of nature we are unlikely to see fundamental change necessary to sustain ecosystem services or conserve biodiversity.

Accurately assessing the value of nature and incorporating it into decision-making presents ecological, economic and political challenges. The difficult ecological challenges include assessing the likely consequences of human actions on ecosystems and their impacts on the provision of ecosystem services in both the short and long run. Difficult economic challenges include assessing the relative value of changes in various ecosystem services under alternative management options to various groups in society. The political challenges involve making decisions about ecosystem management when there are tradeoffs in the value of services provided to different groups.

Examples of the importance, and challenges, of accounting for the value of nature in decisions will be illustrated with using examples of alternative land use decisions in agricultural watersheds and comparison of the full cost of biofuel versus fossil-fuel production and consumption.

**Navigation, Flood Management and Mississippi River Rehabilitation:
Sustainable Environmental Engineering**

Paul J. DuBow, Mississippi River and Tributaries

Regional Technical Center, Vicksburg, MS

Dr. DuBow is Environmental Program Manager for the U.S. Army Corps of Engineers, Mississippi Valley Division, where he provides technical guidance for the Mississippi River and Tributaries Project on ecosystem sustainability, endangered species and other environmental issues relating to river structures, levees and tributary improvements for navigation and flood risk management along approximately 1,000 miles of the Mississippi River.

Previously he was Director, Research Group in Restoration Ecology, at The University of Newcastle, Australia, Associate Professor of Wildlife Science at Texas A&M University and Assistant Professor of Wildlife Ecology at Purdue University. He has studied wetlands and riverine systems across the U.S., as well as in Australia, Canada, Mexico and Siberia.

ABSTRACT

The Mississippi River is one of the world's great rivers and is the only river in the United States to be formally recognized by Congress as both a nationally significant ecosystem and commercial navigation system. The river has a long and colorful history and has played a significant role in shaping our social and economic development. However, the Mississippi River is not a single homogeneous unit; from its source in northern Minnesota to the Gulf of Mexico one can discern at least five distinct Mississippi Rivers based on geomorphology and hydraulics. Concomitant with these differences in the river are differences in navigation and flood risk management that result in different river management strategies. Levees, reservoirs, floodways, pools and locks are some of the structures that are in place on various reaches of the river to address the concerns of flood risk management and navigation. Consequently, river rehabilitation, as well as recreation, must be developed within the context of the potentially different directions that navigation and flood management have taken the river.

The effects of river regulation, floodplain development and watershed modifications present constant challenges to the integrity of the Mississippi River. Yet, since the late 1980s Mississippi River rehabilitation has proceeded at a quick pace. Because the Mississippi system varies widely in hydraulics and hydrology from source to the Gulf, river rehabilitation likewise takes different forms in different regions along the river. Additionally, the goals, targets and metrics of river rehabilitation are not constant across the entire river. However, the engineering expertise of the US Army Corps of Engineers coupled with the environmental capabilities of the US Fish and Wildlife Service and other federal and state agencies make for a powerful dynamic to meet these environmental concerns.

TOPIC 2
FLOODPLAIN CONNECTIVITY, FLOOD CONTROL AND HYDROLOGIC REGIME

Floodplain 2050: Sustainable Development and Natural Resource Enhancement

Gerald E. Galloway, Department of Civil and Environmental Engineering, University of Maryland, College Park, MD

Gerry Galloway is a Glenn L. Martin Institute Professor of Engineering and Affiliate Professor of Public Policy at the University of Maryland. He recently chaired an Interagency Levee Policy Review Committee for FEMA and a study of deep flooding potential in the Central Valley for California. In 1994, he led a White House study of the 1993 Mississippi River Flood. Dr. Galloway served in the military for 38 years retiring as a Brigadier General. He is a professional engineer, a member of the National Academy of Engineering and a Fellow of the National Academy of Public Administration.

ABSTRACT

Much attention has been focused on the status of today's floodplain. Flood damages continue to grow. Habitat losses in the coastal and the riverine environment are on the rise. At the same time, the nation faces the specter of climate change with its associated intensification of both flooding and drought. The forecast of population growth and the attendant increase in development necessary to house the population will inevitably lead to increased pressure on floodplains. The nation will soon be faced with a dichotomous choice: either it addresses the actions that must take place in order to stem the potential floodplain challenge, or it must accept that the floodplain of the 2050 will be a considerably more hazardous location than it is today. In November 2007, the Association of State Floodplain Managers Foundation brought together flood experts to discuss what these choices might be and how the floodplain would look in this seemingly distant future if appropriate action was taken by the nation. This presentation will describe a floodplain of 2050 that is developed by a nation that sees its land and water as precious resources and therefore protects the natural and beneficial functions of floodplains, wetlands, and coastal areas. As a result, 2050 floodprone areas have been preserved and restored where necessary to provide the maximum amount of natural mitigation of flooding. Integrated water management is an accepted practice and new development is designed and built so that it has no adverse impact on flood levels, sedimentation, erosion, riparian or coastal habitat, or other community-designated values. In this floodplain of 2050, the free market strongly favors sustainable development, so floodprone construction rarely occurs. Risk communication has become so advanced that local decision-making is well informed and individuals and households understand both the risks and resources of natural flooding processes.

Metamorphosis of the St. Louis Confluence Rivers: Two Centuries of Industrialization of the Mississippi, Missouri, and Illinois Rivers... and Counting

Prof. Nicholas Pinter, Southern Illinois University, Carbondale, IL

Prof. Pinter studies earth-surface processes and hydrology applied to a range of problems. The main thrust of this research is on river dynamics and flooding, in particular quantifying increases in flooding due to human modifications of rivers. Work often focuses on "empirical hydrology," meaning using geological and empirical hydrologic data to test assumptions in hydraulic models and hydrologic approaches.

Pinter works primarily on large alluvial rivers, including the Mississippi, Missouri, Rhine, Danube, and others. Work has been funded by the National Science Foundation, MacArthur Foundation, von Humboldt Foundation, and new funding under a Marie Curie Fellowship of the European Commission.

ABSTRACT

Rivers of the St. Louis confluence area, and particularly its large navigable rivers, serve multiple purposes. Some of these goals are compatible, some a matter of competing trade-offs, and some are mutually exclusive. Over the past 100-200+ years, the major rivers in the system have been progressively modified to human needs. The first modification, both in time and in relative impact, has been facilitation of navigation. Other major modifications of the river system have focused on settlement and use of floodplain land and control of flooding. As a result of these and other modifications, the Mississippi, Missouri, and Illinois have been fundamentally transformed, in many locations to anthropomorphic systems that little resemble the rivers seen at the beginning of the historical period. Benefits of these changes include continued economical and efficient transportation and progressively increasing utilization of floodplain land. Adverse impacts include loss of riparian and floodplain habitat as well as systematic increases in flood hazard. Despite multi-billion-dollar investments in flood control and despite vocal protestations to the contrary, flooding on these rivers has increased in magnitude, frequency, and damage in lock-step with, and largely as a result of, the human modifications of the rivers.

Human use of rivers need not be, in this author's opinion, exclusive of the health of these systems, continued ecosystem services, and functional flood conveyance. What seems to set the Mississippi, Missouri, and Illinois Rivers apart includes (1) the extent and intensity of modifications on some reaches, and (2) the lack of objective, balanced, and scientific evaluation of the benefits versus the costs of changes to the system. Individual projects continue to be approved either without rigorous analysis or with political considerations, local self-interest, and institutional dogma trumping rigorous scientific assessment. A broad variety of new river projects are now either under construction, planned, or have been proposed. The continued health and functioning of these rivers requires a sea-change centered on objective analysis of the complex dynamics of these rivers and the balance of benefits and adverse impacts that would result from further modifications.

TOPIC 3:
ETHANOL PRODUCTION AND THE MISSISSIPPI RIVER

Crop Residue as Biomass Feedstock: Fact v. Fiction

Michael D. Hubbs, Director of Ecological Sciences Division, Natural Resources Conservation Service, U.S. Department of Agriculture, Washington, DC

Mr. Hubbs has held numerous positions with NRCS. Before coming on as Director of Ecological Sciences Division, he served as State Conservationist in Kentucky. He has served as National Agronomist and National Nutrient Management Specialist in Washington DC. He began his career in 1977 as a soil conservationist in Tennessee. He served as a soil conservationist both in Cleveland and Memphis Tennessee from 1977-1979. He served as District Conservationist in four locations in Tennessee, Maynardville, Dandridge, Morristown, and Memphis from 1979-1991. From 1991-1994, he served as Area Resource Conservationist in Columbia, Tennessee. He served as State Agronomist from 1994-1996, and served as Agronomist on the Soil Quality Institute 1996-2004.

He holds a Bachelor of Sciences degree in Plant and Soil Sciences from University of Tennessee and a Master of Agriculture degree focusing on Agronomy and Soil Quality from Auburn University.

Susan S. Andrews, Leader, National Soil Quality Technology Development Team, USDA-Natural Resources Conservation Service

ABSTRACT

In light of the renewed interest by both industry and government in domestic production of biofuels and other biomass energy, can the more than 500 million tons of crop residue produced each year be used to meet some of our energy needs? The first step is to separate fact versus fiction. Residues were targeted due to the perception that they are a waste product. This is fiction. Residues perform many positive ecosystem functions for agricultural soils, such as maintaining and increasing carbon and nutrients, conserving water, and reducing erosion. Studies since the early 1970s predict that residue removal as an inexpensive feedstock is likely to have unintended environmental costs. Several recent studies and reviews re-examined this issue and reported many similar concerns. Current predicted prices for residue do not make it cost effective for the farmer to harvest and sell residues because the price is below the cost of fertilizer replacement. If this changes and residue feedstock is to be used, the fact is that specific guidelines for residue harvest must be developed, recommending acceptable removal rates with respect to soil type, climate, yield and management. Preferably precision harvest of residues, analogous with precision application of nutrients, would be practiced as topography, texture and yield changes across a field. Despite some shortcomings, existing research and models can be used to guide practices, especially for corn stover harvest in the Corn Belt, which has been studied most extensively. Additional conservation practices, such as no-till, cover cropping, and crop rotations, are necessary to mitigate potential increases in erosion, losses of organic matter and nutrients, and decreases in crop yield. Without these protections, the potential for rapid soil degradation under many residue removal scenarios is high.

Ethanol Production and the Mississippi River

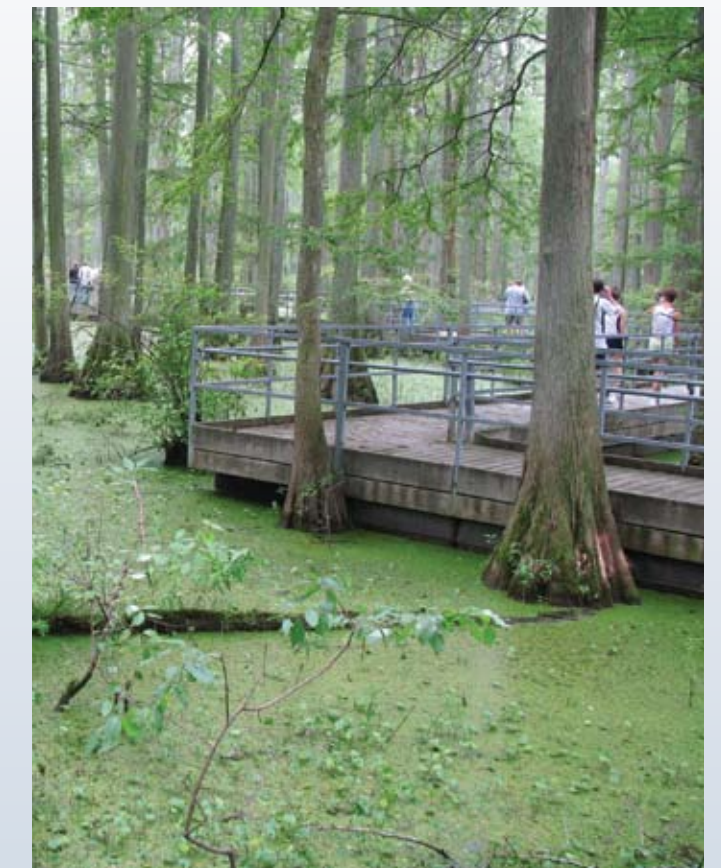
T. Jack Huggins, The Nature Conservancy, Peoria, IL

Jack Huggins has focused on land management practices in agricultural landscapes and their impact on freshwater ecosystems with the Upper Mississippi River Program of The Nature Conservancy. The Nature Conservancy believes that there are opportunities to improve watershed performance both with first generation ethanol crop production (corn) and with second generation crop production (perennial biomass).

Jack is past chairman of the Renewable Fuels Association (national ethanol producers' trade association) and he is on the board of directors of Mascoma Corporation, a leading second generation research and production company.

ABSTRACT

High energy cost, the U.S. focus on energy security, and the need to reduce carbon emissions associated with energy production is creating market opportunities for perennial biomass crops. There may be economic scenarios where perennial biomass crops can replace the traditional corn/soybean rotation in certain landscapes in the Upper Mississippi River Basin. The primary market for the biomass crops would be for ethanol/energy production.



Water Quality Effects of Corn Expansion in the Upper Mississippi River Basin

Silvia Secchi, Southern Illinois University Carbondale, IL

Dr. Secchi is an Assistant Professor in Energy, Economics and Policy in the Department of Agribusiness Economics at Southern Illinois University, Carbondale, IL. She has published on a variety of issues related to the interface between agricultural activities, agricultural and energy policy and the environment, particularly water quality and greenhouse gas emissions.

Dr. Secchi is involved in several interdisciplinary projects - currently funded work includes collaborative efforts on the economics of ethanol production in the Upper Mississippi River Basin and economic and environmental impacts of land use changes at various scales across the Midwest.

ABSTRACT

While biofuels may yield renewable fuel benefits, and reduce our carbon footprint, there could be downsides in terms of water quality and other environmental stressors, particularly if corn is relied upon exclusively as the feedstock. The consequences of increased corn production will depend importantly on where (and how) the additional corn is grown, which in turn, depends on the characteristics of land and its associated profitability. Previous work has relied on rules of thumb for allocating land to increased acreage based on historical land use or other heuristics. Here, we advance our understanding of these phenomena by developing a modeling system that links an economics-driven land use model with a watershed based water quality model for the Upper Mississippi River Basin (UMRB). This modeling system is used to assess the water quality effects of increased corn acreage associated with higher relative corn prices. We focus on six scenarios based on six realistic pairs of corn and soybean prices which correspond to a scale of increasing corn to soybean price ratios, and which are therefore associated with increased corn acreage in the watershed. These price-driven land use changes provide estimates of the water quality effects that current biofuel policies may have in the UMRB. Our analysis can help evaluate more fully the costs and environmental impacts associated with implementation strategies for the biofuel mandates of the new energy bill. Our results suggest that expanded corn production could result into degradation of water quality. In light of these results and those of other studies reaching similar conclusions, it may be appropriate for government to consider implementation of policies that counteract these effects by supporting conservation actions that can offset this degradation. Alternatively, it may be appropriate to re-configure the subsidies for ethanol production to favor alternative feedstocks, such as perennial crops.

TOPIC 4: CLEAN WATER AND THE MISSISSIPPI RIVER – USES AND THREATS

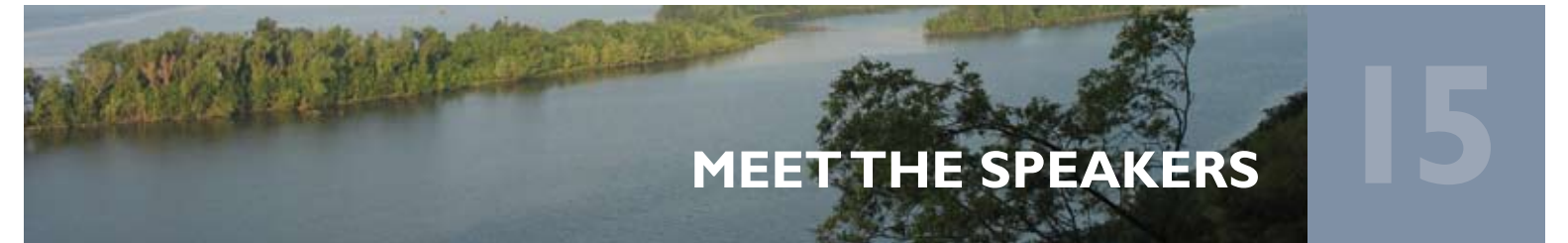
Water Quality of the Upper Mississippi River, From Gags to Fishes

William D. Franz, Upper Mississippi River Team Manager, Watersheds and Wetlands Branch, Water Division, Region 5, Chicago, IL

Mr. Franz is a career EPA employee having begun working at EPA in June 1972 after graduating from the University of Illinois Chicago with a BS degree in Environmental Engineering. He also has a MS degree in Public Health from the University of Illinois School of Public Health. Mr. Franz has worked in the NEPA Review Program for the first 25 years of his career and was the Chief of the Program in Region 5 for ten of those years. The past 12 years Mr. Franz has served as the Region's lead on water quality and environmental restoration issues related to the Upper Mississippi River. In his current capacity he is involved with the states on matters related to Section 303(d) and 305(b), working with the States as the EPA representative to the Upper Mississippi River Basin Association, (UMRBA), and the Water Quality Task Force of the UMRBA, as well as working with the Corps of Engineers on their environmental restoration program on the Upper Mississippi River, coordinating Regional efforts related to hypoxia in the Gulf of Mexico, and the biomonitoring/early warning network on the Upper Mississippi River.

ABSTRACT

An overview of the water quality of the Upper Mississippi River from the 1940's on reveals that the enactment of the Clean Water Act had profound effects on this ecosystem. Whereas point-source pollution and certain other stressors have been greatly reduced as a result of this legislation, a variety of other issues still threaten the biological integrity of this great river. Additionally, the criteria used to define impairment for this river, and other great rivers, needs additional thought and research. I will touch on some of the future challenges that we may face in sustainable management of the Upper Mississippi River.



The Mississippi River and the Dead Zone: Where Science Meets Policy

Matt Rota, Gulf Restoration Network, New Orleans, LA

Mr. Rota is the Water Resources Program Director for the Gulf Restoration Network. Through his work with GRN, he advocates for healthy waters throughout the Gulf of Mexico region. He also works with Mississippi River Basin organizations to promote policies that will reduce the Dead Zone-causing pollution flowing to the Gulf of Mexico.

Mr. Rota currently focuses on water pollution issues in Louisiana, the Mississippi River, and the Gulf of Mexico, working to ensure adequate policies regarding wetlands, water quality, and nitrogen and phosphorus pollution are adopted and implemented in order to protect and restore waters of the Gulf of Mexico region.

ABSTRACT

It has been well established that a large dead zone forms in the Northern Gulf of Mexico each summer. It has further been established that the root cause of this dead zone is the nitrogen and phosphorus pollution that flows into the Mississippi-Atchafalaya River system from sources such as agricultural lands and urban water treatment plants. Though we have known and studied these causes for years, we have seen no reduction in the size of the Gulf Dead Zone.

While the science revolving around the Gulf Dead Zone will continually advance, the reason that it persists at such a large size is because of policy decisions, or lack thereof. There are many reasons why strong policies do not exist to properly protect the River and Gulf. One of these reasons was well stated by the National Academies of Science, when they called the Mississippi River an "orphan," meaning that no state is willing to take responsibility for it. But ignoring this orphan will not make it go away; instead we must address Mississippi River pollution and the Gulf Dead Zone on the local, state, and federal levels, utilizing regulatory and voluntary mechanisms effectively.

Assigning blame and doing things the way that we always have done will not clean up the Mississippi; instead we need to use the best science to re-think how we are implementing programs throughout the basin. We will only be able to adequately address the Dead Zone and its causes if we use our knowledge of advanced farming techniques, implement strong regulatory programs, establish new conservation incentive programs, utilize current nutrient science, and truly embrace the goal of reducing the size of the Dead Zone.

Mississippi River Water Quality and the Clean Water Act

David M. Soballe, Engineer Research and Development Center, Vicksburg, MS

David M. Soballe is currently a research biologist with the U.S. Army Corps of Engineers. He has conducted over 25 years of research in limnology, water quality, and river and reservoir ecology and has held research positions with state and federal agencies and academic institutions. Dr. Soballe has extensive experience working in interagency groups on water quality monitoring, data acquisition and environmental management and restoration. He has expertise in the requirements and difficulties of monitoring a large floodplain-river system and in using monitoring data to guide management decisions on restoration.

ABSTRACT

Long-standing and growing concerns about lack of coordination among states in the implementation of the Clean Water Act to protect and improve water quality in the Mississippi River prompted the McKnight Foundation to sponsor a study by the National Research Council (NRC) to examine the issues and suggest possible routes forward to protect the Mississippi River. The study committee reaffirmed major improvements in water quality that were achieved under The Act, but also noted The Act had fundamental weaknesses that did not promote effective approaches to the problems of spatially distributed pollution sources and destruction of aquatic habitat in a multi-jurisdictional system that forms part of 10 state borders.

In this presentation, I will emphasize the technical issues associated with measuring and managing water quality in the Mississippi River. I will frame these in the context of the NRC report (of which I was a co-author) and point out the challenges of collecting and interpreting the water quality data needed for a Clean Water Act assessment of this large and highly-diverse river system. Some large-scale patterns in water quality and material transport in this river will be illustrated, as will be the particular difficulties of tracking water quality trends at time and space scales that are appropriate to understanding the behavior of this large river. Well-recognized, geo-fluvial principles contribute to the changing character of the River, from upstream to down, and one result is that attitudes toward the River, and its water quality, can differ radically along the river corridor. Another consequence is that water quality goals can be diametrically opposed between geographic regions.

The technical challenges to protection of water quality in this large system are daunting. A responsive, cooperative, and coordinated, multi-state organizational structure, with strong technical elements is needed if water quality in this enormous system is to be effectively protected, managed, or enhanced.



Dr. Brian D. Anderson

Illinois Natural History Survey
Institute of Natural Resource Sustainability, University of Illinois

Dr. Brian D. Anderson came to Illinois in 1985 to become the third Director of the Illinois Nature Preserves Commission (INPC). Under his 10-year leadership the INPC staff grew and protected over 100 new Illinois Nature Preserves. During his tenure the Rules for Management of Illinois Nature Preserves were updated, the Master Planning Process was modernized, and the Register of Land and Water Reserves was established. During this period Brian also facilitated, and with Karen Witter staffed, Governor Edgar's Water Resources and Land Use Priorities Task Force which laid the foundation for Conservation 2000.

After going on an intergovernmental exchange to the National Biological Service in Washington D.C., where he helped lay the groundwork for the establishment of the Biological Resources Division within the U.S. Geological Survey, Brian returned to accept the position of Conservation 2000 Coordinator with the Illinois Department of Natural Resources (IDNR). He then helped establish the Ecosystem Partnership Program of Conservation 2000, and supported and promoted the CTAP, EcoWatch, and Watershed Management programs within IDNR. Brian eventually also served IDNR as Director of the Office of Scientific Research and Analysis, where he served as liaison between IDNR and the Illinois Scientific Surveys and State Museum; and as Director of the Office of Resource Conservation. In the former capacity he represented the IDNR Director on Governor Ryan's Smart Growth Cabinet and Energy Subcabinet.

Brian left Illinois state government after nearly 20 years of service to become Chair of the Department of Biological and Physical Sciences at Lincoln Land Community College (LLCC) in 2004. In 2006 he became the Assistant to the President for Planning and Institutional Improvement at LLCC. In May of 2008 Brian became the 8th Chief of the Illinois Natural History Survey (INHS), and immediately became immersed in migration of the INHS from State of Illinois oversight into the University of Illinois at Urbana Champaign (UIUC). As one of many changes related to the transition to UIUC, his title has become "Director" of INHS.



Ms. Janet R. Burnett

County Extension Director
Madison/St. Clair Unit

Janet Burnett is the County Extension Director for University of Illinois Extension in Madison and St. Clair counties. She has a master's degree in public administration/public policy from Southern Illinois University, Edwardsville and a bachelor's degree in home economics education from Eastern Illinois University.

In her role as county extension director, Burnett oversees Extension programming in four broad areas: nutrition, family and consumer sciences; community and economic development; agriculture and natural resources; and 4-H/youth development. She is a member of the National Association Extension Consumer and Family Sciences and the League of Women Voters for the Edwardsville area.

Janet and her husband, John, residents of Edwardsville for 34 years, have two adult children.



Dr. Michael D. Jawson

U.S. Geological Survey
La Crosse, WI

Dr. Jawson is currently the Director of the Upper Midwest Environmental Sciences Center (UMESC) in La Crosse, Wisconsin. UMESC is an USGS (United States Geological Services) Biology Center conducting research and monitoring on larger river ecosystems, endangered species, invasive species, wildlife ecology and conservation, fisheries management chemicals and drugs, wildlife toxicology and geospatial information. He has more than 30 years of experience working on environmental issues with the goal of improving environmental quality and ecosystem management.

Previous work experience includes that as a National Program Leader (Soil and Water, Manure and Byproduct Utilization, Climate Change and Integrated Agricultural Systems National Programs) for USDA-ARS (1996 - 2005), Chief of the Ecosystem Restoration Branch at US EPA's Environmental Research Laboratory in Ada, Oklahoma (1990 -1996), Assistant Professor of Environmental Microbiology at the University of Nebraska Lincoln (1983 - 1990), and Soil Scientist with USDA ARS (1976 - 1980). He has degrees from the University of Wisconsin-La Crosse (1971), the University of Wisconsin-Madison (MS degrees in Soil Science and Water Resources Management in 1976) and Washington State University (PhD, 1983).



Mr. Ed Weilbacher

Coordinator
USDA Natural Resources Conservation Service

Ed Weilbacher is the Coordinator providing technical assistance to the Southwestern Illinois Resource Conservation and Development Council for the past 18 years. The Council covers the 7 counties in Southwestern Illinois of Bond, Clinton, Madison, Monroe, Randolph, St. Clair and Washington. The SWI RC&D is focused on "Respecting Our Environment, Growing our Future." The Southwestern Illinois RC&D is a regional not for profit 501 (c)(3) organization that has a 20 year track record of accomplishments in the area of natural resource enhancement and protection, sustainable economic development and water quality improvement.

Ed Weilbacher received his BS from Western Illinois University and has worked for USDA NRCS for 35 years in a variety of locations throughout Illinois. He served as a technician in Belleville and Macomb, a District Conservationist in Woodstock, Danville and Sparta, an Agronomist/Resource Conservationist in Kankakee and 18 years as the Coordinator for the Southwestern Illinois Resource Conservation and Development in Mascoutah.

Ed and his wife Kathi live in Waterloo and own and operate the Senator Rickert Residence Bed and Breakfast.

**TOPIC 1:
ECOSYSTEM SERVICES
AND THE ECONOMIC VALUE OF
THE MISSISSIPPI RIVER**

Mr. Robert Blocker
AEP River Operations

Dr. James Caudill
U.S. Fish and Wildlife Service

Mr. Marvin Hubbell
U.S. Army Corps of Engineers

Mr. Rob Maher
Illinois Department of
Natural Resources

**TOPIC 2:
FLOODPLAIN CONNECTIVITY,
FLOOD CONTROL AND
HYDROLOGIC REGIME**

Mr. Edward Brauer
U.S. Army Corps of Engineers

Dr. David Galat
Missouri Cooperative Fish
& Wildlife Research Unit

Mr. Mickey Heitmeyer
Greenbrier Wetland Services

Mr. Todd Strole
The Nature Conservancy

**TOPIC 3:
ETHANOL PRODUCTION
AND THE MISSISSIPPI
RIVER**

Dr. Jeff Houser
USGS Upper Midwest
Environmental Sciences Center

Mr. Bob McLeese
USDA – Natural Resource
Conservation Service

Mr. Eric Schenck
Ducks Unlimited

Ms. Anne Steckel
Growth Energy

**TOPIC 4:
CLEAN WATER AND
THE MISSISSIPPI RIVER –
USES AND THREATS**

Ms. Christine Favilla
Piasa Palisades Group of the
Sierra Club

Mr. Mike Sullivan
USDA Natural Resource
Conservation Service

Ms. Marcia Willhite
Illinois Environmental
Protection Agency

Mr. Roger Wolf
Iowa Soybean Association



**The Visions of a Sustainable Mississippi
River Conference**

will allow a diverse collection of stakeholders to participate in meetings, presentations, and workshops, culminating on the final day in a Policy Forum. Hosted by the Honorable Congressman Jerry Costello, the Forum will provide the opportunity for consensus-based recommendations to be delivered to a group of federal, state, and congressional officials who craft policy that affects the Mississippi River and its surrounding communities.

The policy officials are being invited because of their key roles in shaping policy for stewardship of the Mississippi River. The intent of the Policy Forum, a signature feature of the conference, is to provide these officials with tangible and realistic proposals that will aide them in their efforts to address many of the major issues facing those who live and work on the Mississippi River.

Invited officials include (but are not limited to) Brigadier General Michael Walsh and the Mississippi River Commission, a group of Senate-confirmed Presidential nominees committed to sustainable management of the river; Nancy Sutley, Chair of the Council on Environmental Quality; Illinois Governor Patrick Quinn, Chair of the Illinois River Coordinating Council; Representative Norman Dicks,

Chair of the House Appropriations Subcommittee on the Interior and Environment; Senator Byron Dorgan, Chair of the Senate Appropriations Subcommittee on Energy and Water Development; Ken Salazar, Secretary of the Interior; Ray LaHood, Secretary of Transportation; Dave White, Chief of the USDA's Natural Resources Conservation Service; Dr. Suzette Kimball, Acting Director of the US Geological Survey; and Mr. Marc Miller, Director of the Illinois Department of Natural Resources.

Visions of a Sustainable Mississippi River are more than inspirational dreams; they are a call to action in a world demanding much of its fresh water resources. The Policy Forum Luncheon will provide a perspective from other large river systems and highlight how conservation efforts from these systems can inform one another. Scientists visiting from China will be present, and speakers will provide an overview of the Yangtze-Mississippi River exchange and how the development of the Yangtze River has been influenced through international partnerships. The importance of good science in large river management and the need to connect science and policy is leading to the development of the Center for Great Rivers and Sustainability. The concept and vision of this new center will be explored. The luncheon will conclude with the presidentially appointed Mississippi River Commission discussing their call to develop a long term vision for the Mississippi River.



POSTER 1

Linking Habitat Use of Silver Carp to Phytoplankton Consumption in the Mississippi River

Heather Calkins and James Garvey
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POSTER 2

What Happens When it Rains in the Illinois River Watershed?

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POSTER 3

Interdisciplinary "Life on the Mississippi" Proposed Course at Lewis and Clark Community College

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POSTER 4

Birds of the Upper Mississippi River National Wildlife and Fish Refuge

Wayne E. Thogmartin¹, Eric J. Nelson², Timothy J. Fox¹, Lisa Reid², Douglas A. Olsen¹ and Eileen M. Kirsch¹

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POSTER 5

Spring-Fed Wetlands on the Middle Mississippi River Floodplain

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POSTER 6

Combining Nexrad, Radio Telemetry, Landsat, and Ground Technologies to Evaluate Landbird Migration and Identify Stopover Locations along the Upper Mississippi River

Patricia J. Heglund¹, Eileen M. Kirsch², **Melissa S. Meier²** and Manuel Suarez²

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POSTER 7

Overview of an Integrated Waterbird Database for the Upper Mississippi River System and Its Potential Value

Melissa S. Meier¹ and Patricia J. Heglund²

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POSTER 8

The Integration of Flood Loss, Scenario, and Retro Modeling for Use in River Management

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POSTER 9

Assessing the Feasibility of Restoration and Management Actions on the Mississippi River within the Twin Cities, Minnesota

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POSTER 10

Green Roofs as a BMP in the Mississippi River Watershed

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POSTER 11

Better Wet than Dry: A New Strategy to Finance Wetland Restoration via Ecosystem Services

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POSTER 12

Information Needs and Difficulties with Floodplain Management 2009 Missouri Floodplain Manager Survey Results

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POSTER 13

Social Resilience after the 2008 Mississippi River Floods and Implications for Long-Term Socio-Ecological Sustainability

David G. Casagrande and Heather McIlvaine-Newsad
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POSTER 14

Floodplain Restoration and Reconnection at Upper Ouachita National Wildlife Refuge, Louisiana

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POSTER 15

The Confluence: Reconnecting People to America's Great Rivers

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POSTER 16

Clean Water Act Designated Uses for the Upper Mississippi River

Peg Donnelly¹ and **Dave Hokanson²**
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POSTER 17

Coastal Louisiana Restoration: From Plan to Action

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POSTER 18

Vegetation Survey of the Palisades Nature Preserve

Matt Wickenhauser and Lyle Guyon
National Great Rivers Research and Education Center

POSTER 19

Economic Benefits of Habitat Preservation

Patricia Hagen
St. Louis Audubon Center Project
Department of Public Policy
Saint Louis University

POSTER 20

Alton Regional Convention and Visitor's Bureau & Meeting of the Great Rivers Scenic Byway Social Media Research, Planning and Implementation

Amitie L. Flynn¹, Suzanne Halbrook² and Brett Stawar²

¹Lewis and Clark Community College

²Alton Regional Convention and Visitors Bureau

POSTER 21

The 90-Day Plan: 90 Ways in 90 Days to Clean & Conserve Water in the Mississippi Watershed

Kristian Gustavson

Below the Surface, A Coast-to-Coast Exploration of America's Waterways
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POSTER 22

Evaluation of Nine Native Plant Species Planted in Four Growth Media Depths for Extensive Green Roofs

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POSTER 23

Environmental Education, Outreach and Programming

Erin Hilligoss-Volkman, Kim Rea and Jessica Pascoe
National Great Rivers Museum,
Meeting of the Rivers Foundation
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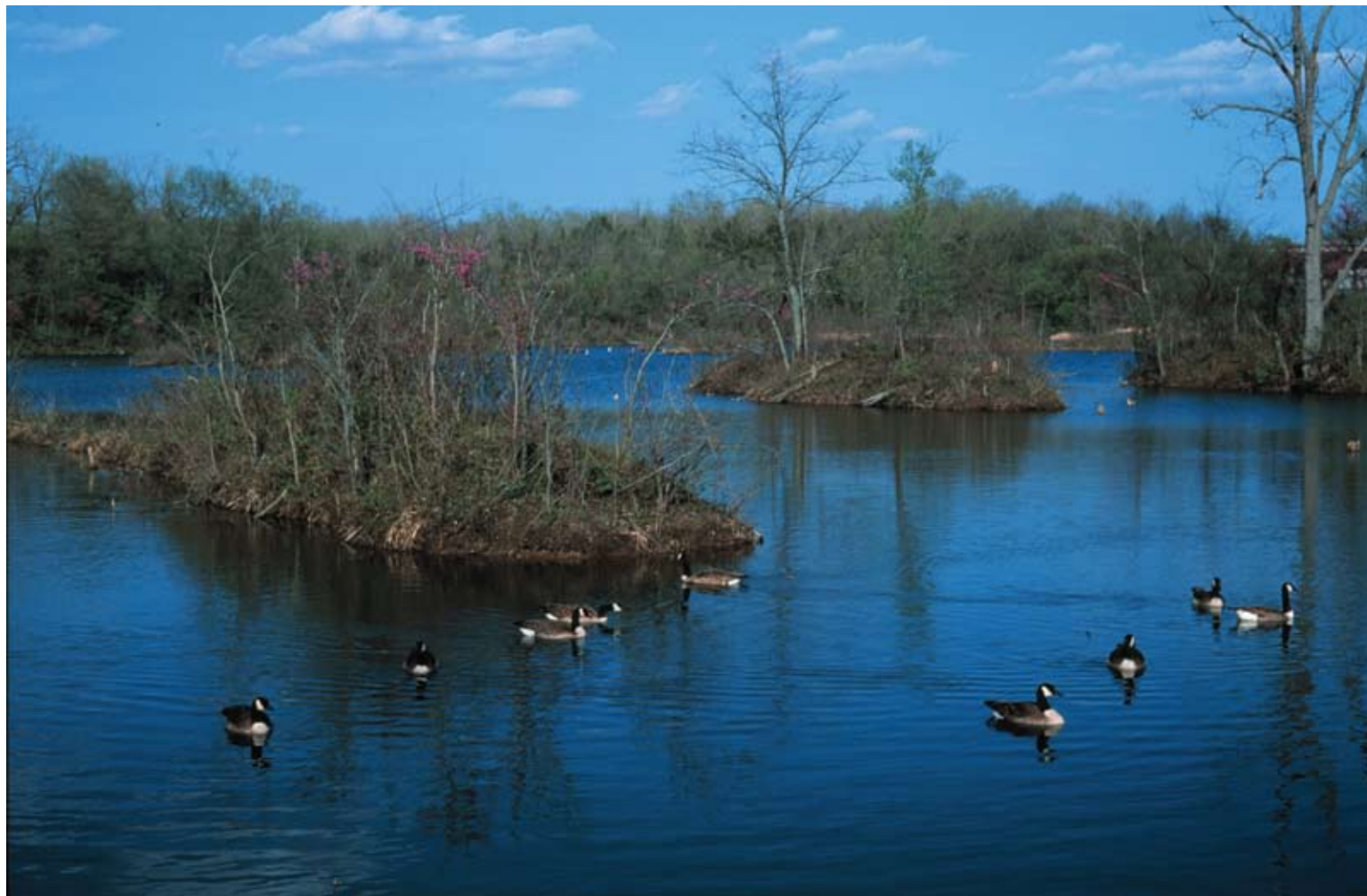


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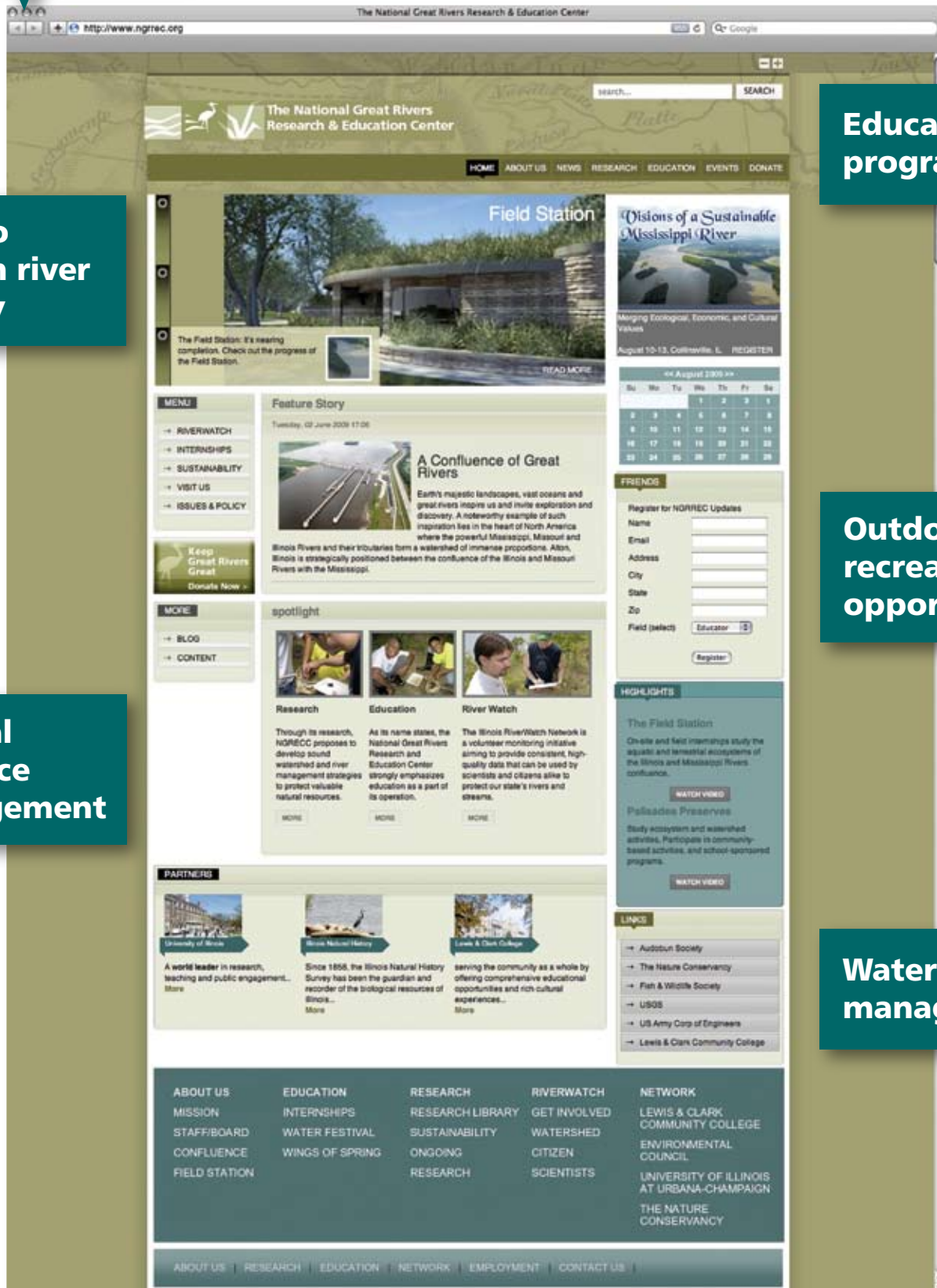
CONFLUENCE FIELD STATION



The National Great Rivers Research and Education Center's (NGRREC) Confluence Field Station is on schedule to open in the winter of 2009. The Field Station will be the first institution of its kind to offer a comprehensive river system research and education program. The building will be a model of green construction with internal recycling systems, renewable energy systems and virtually no environmental impact. Some of the sustainable design elements will include a vegetative roof, long-wearing bamboo floors, innovative waste water technology, on-site wind and hydro power, and many other environmentally friendly and energy efficient options. NGRREC will seek a Platinum Leadership in Energy and Environmental Design (LEED) certification for the building, the nation's highest recognition of projects that incorporate "green" design principles.

Navigate the Rivers Online

www.ngrrec.org



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