The National Great Rivers Research & Education Center

Few ecosystems are as closely linked with the development of human civilization as great rivers, and few ecosystems have been as greatly altered by humans. Sustaining both the ecological and economic health of the Mississippi and other great rivers requires research that addresses critical areas such as invasive species effects on native biota, habitat restoration, nutrient fluxes and strategies to reduce inputs to marine systems. These efforts are hindered by the lack of world-class scientific facilities for river scientists. The scientific study of large rivers and their watersheds has lagged far behind the study of other aquatic ecosystems. Other large aquatic ecosystems, such as 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). At the present time there are no comparable facilities for research on these fresh water systems.

The National Great Rivers Research and Education Center (NGRREC) has a solid program and state-of-the-art facilities to address critical watershed issues pertaining to large rivers, the watersheds that feed these rivers and the human communities that depend upon the economic and environmental services provided within the watershed. Research is underway that is used to better inform our management and governance of these important natural systems. Additionally, NGRREC's environmental education and outreach programs have reached thousands of students ranging from kindergarten to Ph.D. with programs that foster environmental stewardship to sophisticated research and policy work important to furthering our understanding and management of great rivers and their watersheds. NGRREC Symposia and professional development training reaches researchers, educators, practicing ecologists and other water resource professionals with timely information improving performance and career satisfaction.

NGRREC – A Land-Grant University/Community College Partnership

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. A key concept of the land-grant system was the accessibility and responsiveness to the average citizen. Unfortunately, this accessibility and responsiveness is rapidly disappearing as state land-grants become oriented to different goals to be competitive with other institutions. However, it is clear that the need to be in touch with local and regional real-world issues is still a mandate as land-grants strive to be relevant and responsive to local citizens and community needs.

A new model for land-grants is needed and partnering with community colleges offers significant opportunity to become more relevant and responsive as community colleges are at the heart of local and regional issues and directly involved with local citizens. Land-grants offer the community colleges they are partnering with the opportunity to develop research responsive to local and regional needs with the assistance and support of a world-class research program. A land-grant community college partnership also strengthens educational programs for students at both

institutions and promotes development of new joint educational opportunities in touch with societal needs.

The University of Illinois, a land-grant institution and Lewis and Clark Community College have pioneered such a partnership through the establishment of the NGRREC. This research, education and outreach center has a laser focus on the ecology of large rivers, their watersheds and the human communities that depend on them. The Center has become in just a few years the centerpiece of freshwater research in the country. Its success is due in large part to the land-grant community college partnership which has provided a balanced support of NGREEC programs while returning significant benefits to each partner. A great synergy has developed which offers each institution returns and opportunities not otherwise achievable

Completing the relationship between the University of Illinois and Lewis and Clark Community College beyond expanded research and student educational opportunity is the direct feedback to workforce training programs. Such programs are at the core of the community college and can now be shaped by relevant research and be more responsive to citizen need and opportunity.

Sharing this pioneering 21st century model for land-grants and community colleges is underway with land-grants in the upper Mississippi Watershed and community colleges along the river as well as institutions across with country through the American Association of Community Colleges.

Jerry F. Costello Confluence Field Station

Situated in an area rich with local, state, federal, and private water resources infrastructure, the site on which the Field Station is located is a unique living laboratory to study rivers, their floodplain, and how we manage regulated rivers and streams. For example, directly across the Mississippi River from the Field Station is a 3,700-acre bottomland environmental restoration project, and immediately downriver lies an 800-acre Maple Island, licensed to NGRREC for ecological research. Program managers at the Corps of Engineers, U.S. Department of Agriculture, and U.S. EPA are bringing federal dollars to NGRREC scientists for applied research outputs that are better informing water resource management efforts.

The Field Station hosts state-of-the-art research facilities including mesocosms. The mesocosms are three pairs of 75’ x 6’ concrete raceways that are semi recessed below the deck; 3’ above the grade and 3’ below grade. Weirs and screens of different sizes will be placed at different locations to offer the scientist a multitude of options for setting up various experiments. Each raceway will have individual electronic control of the water depth, water velocity and water volume allowing for experiments to be conducted simultaneously with multiple parameters.

Global River Ecological Observatory Network

NGRREC affiliates with the Illinois Natural History Survey have been collecting water quality and fish data on the UMRS for the Long Term Resource Monitoring Program (LTRMP) 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 with the YSI Corporation 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, but

we plan to expand to other great rivers throughout the world, creating a Global River Ecological Observatory Network (GREON).

The Great Lakes to Gulf Virtual Observatory Initiative: Knowledge Underpinning Policy

Given its location, focus, and partners, NGRREC is ideally positioned to connect the issues that extend from the Great Lakes to the Gulf of New Mexico. An important facet of NGRREC's mission is to underpin policy considerations with reliable knowledge. Thus, NGRREC and partners are launching the Great Lakes to Gulf Virtual Observatory Initiative to help expedite the data-to-knowledge-to-policy connections.

The initiative will help prioritize the reliable knowledge and related data sets needed to optimize large scale conservation programs; facilitate collaborations and data sharing; and enable automated data extraction interfaces with highly visual decision support tools.

The spatial and temporal focus of the Great Lakes to Gulf Virtual Observatory is directly relevant to the recent National Research Council considerations of the Mississippi River water quality problems. The NRC reports emphasize the needs for more comprehensive system monitoring, more effective date-to-knowledge approaches, the development of water quality indicators and standards, and policies and implementation.