
Sustaining the Ecological Integrity of Large Floodplain Rivers:

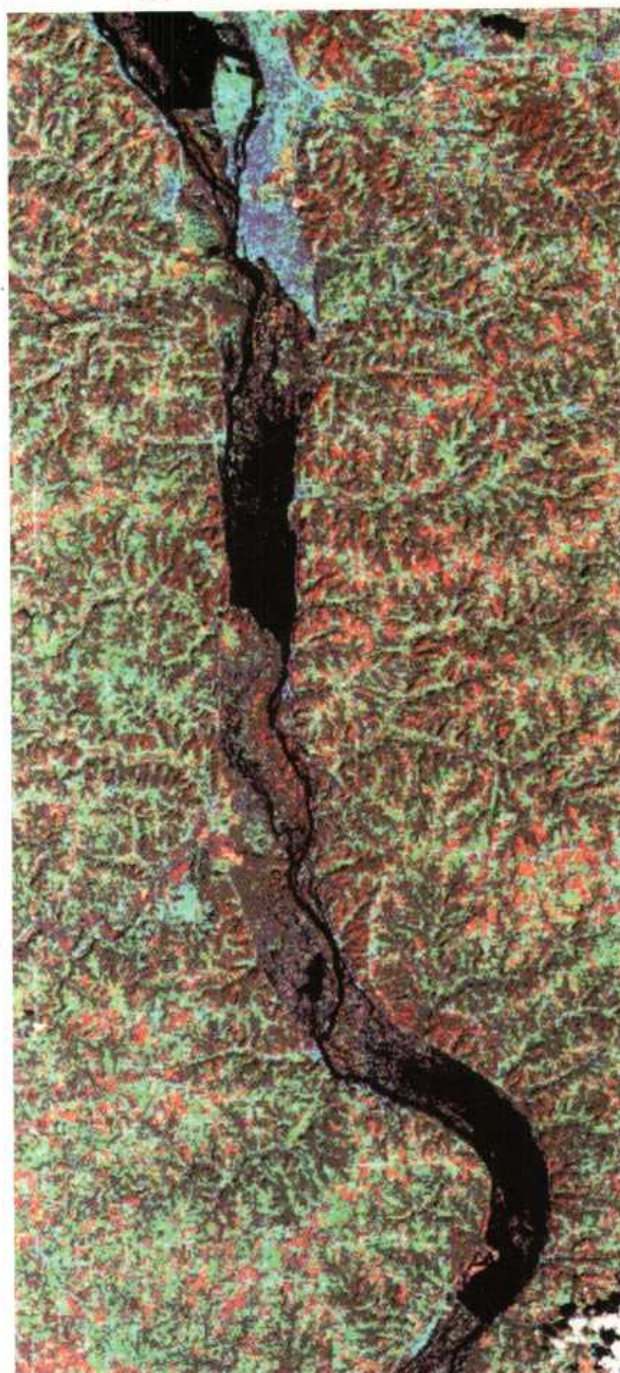
*Application of Ecological Knowledge to
River Management*

Conference and Workshop Summary

International Conference
July 12-15, 1994

**Companion Workshop for the Upper
Mississippi River System**
*Applying the Principles of Ecosystem Integrity to
the Management of the Upper Mississippi
River System*
July 18-19, 1994

*Hosted by the Environmental Management
Technical Center (U.S. Department of the Interior,
National Biological Service), Onalaska, Wisconsin,
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tion and Extension, University of Wisconsin-La
Crosse, La Crosse, Wisconsin, U.S.A.*



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International Conference
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*Applying the Principles of Ecosystem Integrity to the Management
of the Upper Mississippi River System*
Companion Workshop for the Upper Mississippi River System
July 18-19, 1994

Prepared by
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June 1995

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Credits

Cover Illustration: Navigation Pools 8 and 9, Upper Mississippi River. Taken from a 1989 Landsat Thematic Mapper scene using bands 4, 5, and 7. The blue area in the upper right of the floodplain is La Crosse, Wisconsin. Open water appears black; agricultural areas and pastureland are bright red; forests are brown. The floodplain at the lower end of Pool 9 is approximately 3.7 km wide. (Mark Lastrup and Tom Owens, National Biological Service, Environmental Management Technical Center.)

The upper area of each navigation pool remains similar to the river's pre-impoundment floodplain geomorphology as compared to the lower, impounded area. This reach of the Mississippi River Valley flows through what is known as the "driftless area" of the Upper Midwest, an area untouched by the last glacier, accounting for the characteristic local tributary and basin pattern.

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Foreword

"One point has struck me most forcibly. When I was a student, I looked across the pond and I saw the U.S. as a nation which used big dams—Hoover Dam, Lake Mead, the TVA—as symbols of your national achievement. They were symbols that you marketed throughout the world to show how you could control nature. And I think that what has really struck me today is that that image has now completely changed. And I think that is a very forward-looking thing: there has been a complete change in attitude and that really is very encouraging. Clearly, there is concern, real concern, for sustainable development."

"There is an opportunity now for restoration of the ecological integrity of the Upper Mississippi. Further, I would suggest that there is an opportunity for the restoration of the ecological integrity of the Upper Mississippi to become your new symbol of the way in which you want to see management move in the future. And that's a symbol that I think we from the other side could use to help us move in the same direction."

Geoff Petts
University of Birmingham, United Kingdom
Editor-in-Chief, *Regulated Rivers*

These comments were made by Dr. Petts during the workshop *Applying the Principles of Ecosystem Integrity to the Management of the Upper Mississippi River System*.

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Introduction

In July 1994, the Environmental Management Technical Center (EMTC), with the assistance and support of several Federal, State, and private organizations (see back cover), hosted the international conference "Sustaining the Ecological Integrity of Large Floodplain Rivers: Application of Ecological Knowledge to River Management." The conference provided an opportunity for 500 scientists and natural resource managers to discuss the world's large rivers, the processes that control their structure and function, their ecological integrity, and the ways in which that integrity has been impacted by human activities.

Twenty countries were represented at the conference. Approximately 70 platform and 80 poster presentations were made and 60 draft manuscripts were submitted for peer review. Manuscripts that pass the review process will be published in the journal *Regulated Rivers: Research and Management* in 1995. Several additional papers of special interest will be published separately by the EMTC.

The conference was followed by a workshop that focused on applying the principles of ecological integrity to the management of the Upper Mississippi River System (UMRS). A special panel consisting of members of the President's Council on Sustainable Development attended the workshop.

This document contains three articles generated at the meetings which, together with the special issues of *Regulated Rivers*, provide suitable closure to the event. The articles present scientific, political, and public perspectives on three issues that dominate current resource management discussions on the UMRS: the

potential future expansion of the commercial navigation system; the aftereffects—especially potential floodplain management alternatives—of the Flood of 1993; and the need to plan, develop consensus for, and implement ecosystem management strategies.

The first article was written at the request of the conference planners to provide a link between the conference and the workshop. Several internationally known scientists (see signature page) were asked to synthesize the guiding principles of floodplain river ecology required to establish a scientific basis for addressing management issues on the UMRS.

The second article is the keynote address presented at the workshop by Secretary of the Interior Bruce Babbitt. The address conveys the attention and interest now held by the U.S. Government in seeking ways of sustaining the ecological integrity of the Nation's natural resources.

The last article summarizes audience responses to specific questions presented at the workshop. These responses provide feedback to management agencies that reflect how the public perceives the ecological integrity of the UMRS and the suggestions from workshop participants for maintaining or improving its quality. Several of the recommendations were formulated specifically for the President's Council on Sustainable Development.

A conference and workshop List of Participants containing names and affiliations of registrants is also provided. Addresses and phone numbers of participants are available at the EMTC by request to assist those interested in continuing the dialog.



Ecology of Large Floodplain Rivers and its Relationship to Management: 1994

Presented by invited scientists at the conference
“Sustaining the Ecological Integrity of Large Floodplain Rivers”
 July 12-15, 1994, La Crosse, Wisconsin

Several internationally known scientists (see signature page) were asked to synthesize the guiding principles of floodplain river ecology required to establish a scientific basis for addressing river management issues. River managers (see Acknowledgments) were enlisted to provide feedback to the scientists. This paper is the result of that synthesis effort.

The first draft of this paper was prepared during the conference and was read and evaluated by the audience as a whole during the last session. Reviews of interim drafts were solicited from the invited scientists.

Historical Background

At the turn of this century, researchers had a considerable grasp of the processes regulating the productivity of large rivers. But the time was not yet ripe for ecological approaches to river management, and industrial imperatives prevailed. As a result, the floodplains of most temperate rivers were developed for human occupation or agriculture and their natural communities and habitats were increasingly confined to smaller areas.

A geomorphological understanding of large river processes has been well established for many years. In contrast, knowledge of the ecology of large temperate rivers is comparatively recent. Temperate river research typically concentrated on smaller rivers, and prior to the mid-1970s, work on large rivers was limited to the tropics, where sizeable floodplains and fisheries persisted. Thus, current theories on the ecology of river-floodplain systems were formulated in the tropics and were transferred to temperate regions through a series of publications and meetings. The

most notable turning point in this process was the September 1986 Large River Symposium in Honey Harbour, Ontario, Canada, which was largely summarized by the flood pulse concept.

Ecological research and the development of matching management concepts relating to large rivers are therefore very recent. Although the river community has frequently expressed impatience at the slowness of progress, the historical perspective demonstrates an extremely rapid revolution in the way we think about rivers.

Guiding Principles for River Management

Ecological research and experience from a wide variety of large floodplain rivers indicates that the following principles for river management should have broad applicability:

- River form and condition is a function of the totality of many actions and processes that occur in the basin, stream network, and floodplain.
- The degree of connectivity between the main channel and its floodplain is a primary structural attribute of river ecological integrity.
- The annual flood pulse, channel-forming floods, and infrequent droughts are major driving factors in floodplain river ecosystems.
- Rivers and their fauna are very resilient and measures to improve or rehabilitate them, if taken before critical levels are reached, can produce rapid positive responses within the system.



- Ecosystem reaction to stress is often expressed catastrophically through critical breakpoints that only can be determined retroactively. That a breakdown in a system is likely can be anticipated, but foretelling the actual time when it will occur is far more difficult.

Current Ecological Status of Large Floodplain Rivers

The resilience of large floodplain rivers permits living aquatic communities to support a considerable degree of insult—frequently leading to false optimism concerning the health of the system in question. However, if stress is excessive, losses of species and overall diversity occur.

Most rivers in the world are now stressed or degraded (Fig. 1). Species have disappeared and living aquatic communities have been corrupted worldwide.

Because they are so difficult to rectify, the greatest stresses on large rivers are produced by high dams and reservoirs. Separations from the floodplain by levees are equally damaging, for although technical solutions are relatively easy, the degree of human occupancy of the floodplains usually renders such solutions impracticable. Introduced species are viewed as an area of special concern because they are so difficult to eliminate, but once these species are established, they must be incorporated into future planning. Eutrophication and pollution, especially when sustained, also stress biota and the quality of water. Sediment may also be a limiting factor for river restoration. In such cases, the immediate objective is to improve environmental health.

The Mississippi River and its tributaries exist in various states of health (Fig. 1). Many species have disappeared in the past and further extinctions may be predicted for the future if present policies persist. The health of the Upper Mississippi, while in decline, is not yet as degraded as that of the lower river, due in part to the habitat diversity created by the lock and dam system and the persistence of active floodplains. The health of the Upper Mississippi is unsustainable, however, because maintaining the navigation canal has

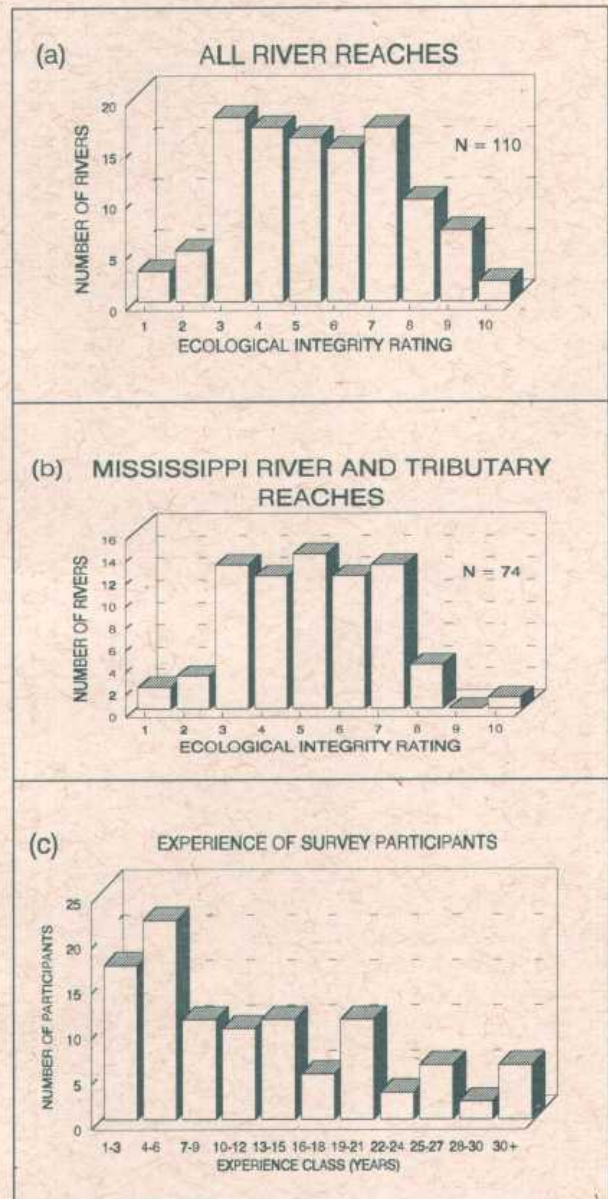


Figure 1. Ecological integrity of river reaches represented at the conference "Sustaining the Ecological Integrity of Large Floodplain Rivers," July 1-15, 1994, La Crosse, Wisconsin. Approximately one-third ($n = 110$) of conference participants returned questionnaires asking them to rate the ecological integrity (on a scale of 1 [poor] to 10 [excellent]) of a river reach they were familiar with. An additional 12 individuals indicated that they did not believe it was possible to realistically rate river ecological integrity at this time. The median rating of all river reaches (a) and those just of the Mississippi River and its tributaries (b) was 5. Experience of survey participants is described with a frequency distribution (c).



resulted in sedimentation and loss of habitat in backwater areas, the mitigation of which calls for continued human effort. The Lower Mississippi, with its almost totally leveed floodplain, poor water quality, and riparian hardening, is very unhealthy. The Missouri, with its extensive channelization and reservoir cascade, is in a high risk condition. Major tributaries such as the Illinois and Ohio Rivers have been degraded by severe insult.

Management

General

A worldwide consensus has emerged to adopt current models of the ecological functioning of large rivers as the basis for their management and rehabilitation. It is generally recognized that the biggest single problem in formulating and executing management policies which incorporate the principles listed above is lack of communication—both upward to decision makers and outward to the mass of people who form the body of public opinion.

There are many users of the river, each having their own perceptions, pressure groups, and financial interests. As a general rule, no one group should be permitted to dominate, nor should it act without reference to other groups. This principle implies collaboration for management among all interested parties and agencies.

In many rivers of the world, pollution effects are secondary to those produced by physical changes. As a consequence, legal frameworks based on chemical control, such as the Clean Water Act, are insufficient to remedy the degrading ecological situation in rivers.

There is a growing move to consider river rehabilitation as a legitimate goal for society in temperate zone systems. Nevertheless, present plans for river management being formulated in the United States, Europe, and Australia are often constrained by special interest groups and thus fail to take sufficient account of the ecological needs of the system.

Part of the problem is the failure to identify and quantify the goods and services provided by a healthy and integrated river. Most of such benefits are not incompatible with other human needs, but space and resources have to be negotiated for all uses. Nevertheless, some uses inevitably impair or degrade others, even though efforts are made to minimize or mitigate the damage arising from them. If the floodplain is leveed and drained for farming, it is no longer available to convey floodwater or provide for the needs of the river's native fish and wildlife species. Society may come to regard the cost of maintaining levees and providing disaster assistance as too high, in which case floodplain restoration will become congruent with damage and cost reduction. Other intermediate choices such as the practice of flood-adapted agriculture or restoration of a portion of the floodplain may be made on the basis of technical and political considerations.

Basin-Level Recommendations

Ecosystem change at the basin scale operates over time periods longer than most river management time scales. However, a growing body of evidence indicates that land uses in a basin that alter rates of water, sediment, or contaminant transport into its rivers have a great potential for impairing their ecological integrity. Therefore, basin management must be an objective of integrated river management, even though benefits may be seen only in the long term.

Floodplain-Level Recommendations

Over shorter time scales than those associated with basin management, benefits of river rehabilitation can be obtained through local interventions aimed at maximizing habitat diversity. It is recognized that improving river integrity through rehabilitation in the floodplain is constrained by locally competing uses including urbanization and agriculture. Nevertheless, certain general suggestions can be advocated now.

Rehabilitation should be guided by the principle that if humans provide the conditions of structure and hydrology, nature will take care of the rest. In this



way, actions will affect the whole assemblage of organisms and not concentrate on one or two favored species to the detriment of the many. Restoring integrity involves freeing the river to some extent to maintain, rebuild, and rejuvenate itself by the natural processes of scouring and deposition.

Rehabilitation efforts on rivers in the temperate zone incorporate the following alternatives:

- Levees can be removed or set back to allow the river to adjust locally.
- Local floodplains can be restored.
- The natural hydrograph, in whole or in part, can be restored.
- When an impairing river use is no longer justified by economic or social benefit, its curtailment or removal should be considered.

Since the implementation of any of these actions is limited by local land use and tenure, the question arises as to how much floodplain restoration is required to make a significant improvement in both the integrity of the ecosystem and its biota and in the provision of systemic goods and services. Current theories on floodplain function predict that the area needed for an improvement to the biota is probably relatively small and could lead toward development in the form of a string of beads with a series of floodplain patches connected by more restricted river corridors. Alternatively, water regulation procedures at navigation

locks and dams could be modified to increase floodplain connectivity during appropriate seasons. Improvements in other functions such as flood storage may require restoration of greater proportions of the floodplain area.

Closing Statement

Many uncertainties remain, and there is a continuing need for sound scientific information in support of an elaboration of biological criteria, the formulation of management guidelines, and fine tuning of the ongoing process. Management actions should be accompanied by monitoring programs which permit their evaluation and adjustment.

In any eventuality, the need for further information should not stand in the way of the urgently needed management actions described above.

Acknowledgments


Mike Davis (Minnesota Department of Natural Resources), Gail Carmody and Jerry Rasmussen (U.S. Fish and Wildlife Service), and Russ Van Herik (The Nature Conservancy) provided valuable guidance and management feedback to the scientists who created this document. Although all of the invited scientists contributed to the ideas embodied in the synthesis, we especially thank Robin Welcomme for providing the written words that became the first draft.




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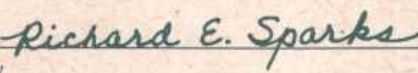
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Science, Sustainability, and the Mississippi River System: North America's Largest River

Founder of the National Biological Service,
U.S. Secretary of the Interior Bruce Babbitt

Address to participants of the workshop

"Applying the Principles of Ecological Integrity to the Management of the Upper Mississippi River System"

La Crosse, Wisconsin, July 20, 1994

Let me just say at the outset that I sense the energy and the enthusiasm and the sense that perhaps we're on the threshold of an historic moment in the history of this river and this ecosystem. It's a sense that I share for reasons I will explain.

I think that perhaps once in a generation there's a conjunction of forces and opportunities that opens up new ways of looking at things, and new opportunities. These moments don't last for long, and that's why I willingly and enthusiastically accepted your invitation to speak here.

The opportunity was triggered by disaster. There's something about a flood, at least a flood of this magnitude, which tends to focus the attention and sensibilities. I think the flood accelerated a number of trends and ways of thinking about things that were gradually converging over the last several years. There's no question that it's the flood that, in a paradoxical way—having wreaked so much destruction and havoc—now presents the opportunity to move on into the future.

I must tell you that as a Westerner, as I look at the Mississippi River, I see a lot of history and phenomena that are new to many of us from the West. It seems to me that human history has impacted this river in a lot of intense and particular ways.

I suppose the human history, at least the European history, of this river began with an intense focus on transportation. In a preindustrial and premotor age, we see an enormous artery spreading across 40 percent of the Nation—the transportation key to Westward

movement across the U.S.—followed on by technology, the advent of the twentieth century, and prospects for flood control which bring the wave of agriculture ever closer to the banks of the river system. And the rise of agriculture intensifies the demands for flood control and gives rise to a greatly accelerated emphasis on transportation for the needs of agriculture. And by the middle of the twentieth century, we find a river that is radically different from the natural river basin and hydraulic system. It has been subdued and shaped to fit the pattern of agriculture, to fit the boats and transportation, and then belatedly, two centuries later, we begin looking back at the ecological cost, the environmental consequences, and the issues of sustainability of this river system. It seems that the price we've paid is very high.

We really ignored these issues way too long. In a sense, we saw the Midwest as an implicit sacrifice area. As the Westward movement crossed this country in an odd way, as we subdued the Heartland of the continent, we were unusually indifferent to the environmental implications of our transformation of the land. We came across this country in a time when environmental values were just beginning to take shape, tended to focus on the Rockies in the West, the grandiose scenery, the Salmon and the Columbia, Mount Rainier, the Grand Canyon, Yellowstone. It was as if there wasn't much environmental significance to the Heartland of the Nation.

And now of course, as we circle back and find with the new eyes of the late twentieth century—with the emphasis on biodiversity, with the understanding of



ecosystems and waterfowl—the richness, the environmental richness, of this Heartland exceeds in many ways the rock and ice summits of the Rockies, talking just in terms of pure biodiversity. And we start to see the consequences of the development and evolutionary patterns.

I'd like to leave you with two very different examples: one at the headwaters of the Platte River in Central Nebraska, and one at the mouth of the Mississippi River in Louisiana. I was out at Grand Island back in March and went out in the morning on the riverbank before dawn, and witnessed one of the most extraordinary phenomena on this entire North American continent, which is, of course, the ingathering for the northward migration for a quarter of a million sandhill cranes. And I stood out there on the banks of the river in the morning, listening and looking at birds congregating and splashing in the river as far as the eye can see, in a scene that had a primeval quality to it, as if we were turning back to the Pleistocene, before the hand of humanity was upon the land. As I watched the cranes coming alive and gradually awakening to the morning and then taking flight, darkening the sky as they moved out of that river out to feed, I thought of the extraordinary phenomenon of their migratory pattern that looks like an hourglass, fans out in the summer across Alaska, comes back to this place, and then fans out across the Gulf of Mexico.

And each spring for one or two weeks this extraordinary phenomenon comes to rest in this one stretch in the Platte River. It's a migratory pattern that is being threatened with complete disruption, and the reason is that on the Platte River we have dammed and consumed and used the water to the point that, in the stretch below Kingsly Dam, where these birds have been migrating for tens of thousands of years, a river once known throughout the West as a mile wide and an inch deep is still an inch deep—but it's no longer a mile wide.

And, the great spring pulses of water that used to flush the Platte and spread out across the land and provide the nesting and feeding grounds of these birds now has been constricted to a tiny little stream impinged by vegetation, threatening to upset the balance of tens of thousands of years because our "improvements" have come close to breaking the entire stream and hydrologic

system of the Platte River.

The second example I bring to you for reflection is the extraordinary transformation of the Gulf of Mexico. I don't think anyone ever really imagined that a century-long system on the Upper Mississippi using dams, locks, and levees to create slack pools for navigation, with the development sequence on the Lower Mississippi of dredging and levees for navigation, could someday, meaning now, threaten the complete destruction of the wetlands systems of Southern Louisiana, which support a rich, wonderful Cajun culture, which support the largest marine shellfish and fishery in the entire United States, being threatened with destruction by the consequences of our development acts. If you fly over the Gulf now, you can see that the wetlands are disappearing. It looks like a textile which has been wetted with acid—they're unraveling, sinking, and disappearing. The sea is moving in and nothing is replacing it.

And the reason is the levee system was gradually moved straight off into the Gulf, in aid of good, secure navigation with levees and dredging. And we've created a conveyor belt which is now taking the sediment that is left when all the works are put together and running it like a conveyor belt clear off the continental shelf tens of miles out into the Gulf of Mexico.

The river used to run like kind of a floppy hose at the mouth, spreading silt all the way across the Gulf, creating islands. As some disappeared, others would show up, maintain an equilibrium. Even as the Gulf is under hydrostatic pressure, sinking overall. All we have left is the sinking. And we're called upon in the eleventh hour and asked, "What do we do about it?"

I leave you with those examples, to which I know you can add many more. I'll summarize the details of the Galloway Report about the lower basin of the Missouri River. It says changes in basin and floodplain physiography and channel morphology have reduced the commercial fish harvest by more than 80 percent and are implicated in the demise of native species. The Missouri River's natural riparian ecosystem has been nearly eliminated and presently consists of a discontinuous single row of trees. Missouri River floodplain forest coverage decreased from 76 percent in 1826 to 13 percent in 1972. Thirty-four species of Mississippi River fish are listed as rare, threatened, or in



danger of special concern. I could go on. We're now in the eleventh hour, engaged in the process of asking together, how can we find a sustainable balance? If it's impossible to recreate a pristine river system—in the sense that was seen by Lewis and Clark—at least one which has room for a balance of all these varying uses and values.

So the question becomes, how do we seize this moment in history to see if we can move toward a process of reintegration searching for a balance? I suggest two approaches that we need to work on with great intensity.

The first is the direct concern of this conference, and that is science. Partnerships with states, academic institutions, and other agencies to see if we can put together a scientific base, not just for the river, not just for the floodplain, but for the watershed as it relates to river management. Now, just a word about this process as I see it. I think that the process has to be a partnership, a coordinated and decentralized type of operation. As we move toward GIS operations, the best approach is to have distributed databases. The day in which you have one agency gathering up and storing information is past. It's at variance with modern information technology that says that real power is working together in partnerships.

To define the nature of the data, to make sure it's collected in a consistent way, what they call metadata standards, and then simply to execute a partnership by saying to all the participants: do your part, maintain your data, and let's work toward an architecture and a framework in which we know what's out there, and talk with each other, and everyone has equal access and equal opportunity in terms of how we move this scientific process forward.

Part two of my question is can we—if we can put together good science, and I believe that we can—translate this into decision making? Can we translate this into a comprehensive approach that will yield an integrated result?

Now I hesitate as I say this, because there are plenty of people who will say, "You're a dreamer. You're dreaming. The Corps of Engineers has always taken care of locks and levees, that's their job and they ain't going to talk to anybody, anywhere, anytime. Agriculture Department and Midwest Congressmen have always done their thing with respect to the economics of price

support systems, and if you think they're going to talk to anyone else, you're dead wrong. The Fish and Wildlife Service has always done its own thing, establishing a refuge here and there, and that's its thing and there's no reason to change. The states have done their thing and we are by nature and design to have a disaggregated system in which the past continues in a straight line into the future, modified only by environmental concerns."

That's a possible scenario. But I would submit that those times are past and the forces of many types are driving us together. We'll see an environment in which agriculture is going to be turning to other sectors and saying that protection of a vibrant, strong, and productive agricultural base requires, in these times, the support of their interests in the basin, including environmental and transportation interests, people who have concerns about floodplain management. Surely the decisions made in the next few years are going to put this item to the test. The Corps of Engineers has a 5-year study under way on another generation of management of lock and dam systems in the lower half of the basin. Now, moving toward decision making. The 1995 Farm Bill will involve a debate. But science without action is ivory tower stuff for academics, and as much as I admire the academics here, I join with you in saying that's not enough. We're not here to seize this momentum by putting rows of studies on shelves to gather dust for another century. So science becomes the absolute important indispensable base, but it must be wedded to action, to a new vision of river management. Now, if you subscribe to that theory, I'd like to take you through a few thoughts about both.

Science needs to come together. We need to see it whole. We need to be looking at the entire river basin. We need to understand that the water in this river system is really a living indicator of everything that is happening in the entire watershed, and a sample of the river water in this neighborhood is a diagnostic tool telling us everything that is happening clear to the crest of the Rocky Mountains and all the way to the North. And as surely as a sample of my blood is a reflection of the health of this particular person, the quality of the water relates not to just water but to every single acre of land in this watershed. And we must, therefore, find a way to begin integrating and coordinating the quality of the baseline data and research within this ecosystem.

The study that has gone on in the interagency



floodplain management has produced a modest beginning in the form of a scientific strategy team. The importance of that is it has given us a model about how we can find why things are and how we can coordinate the collection of data. Now, how do we build upon and improve on that process? The Galloway Report and all of you have some important suggestions about how we integrate collection signs. Some obvious pieces come out of this. We need a hydrologic model for the system. That sounds like the Army Corps of Engineers.

I will make a confession in the spirit of openness, brotherhood, and sisterhood. I grew up in an environment in which the image of the Army Corps of Engineers was Evil Incarnate. And equally, the Bureau of Reclamation was the enemy. But times have changed, they genuinely have. I think the Army is going to be part of the solution. And we now have an Administration in which all are responsible to one people. Most of the players feel it is serious stuff. And we have a Vice President who is directly interested in integrating these issues, and if we don't play ball we'll be in a woodshed that's called the White House.

Based on what I've read in the Galloway Report, just coming off the presses, we have reason to believe that, indeed, there are some new and extraordinary possibilities.

A lot of the data gathering must continue with special leadership from the USGS [U.S. Geological Survey]. This is the geospatial land form, geomorphology, and geologic data gathering. The NBS [National Biological Service] has an exceptionally important role because we now have at the Federal level a place to begin the process of integrating and coordinating the collection of ecosystemic, biological, and related data. I have designated the Technical Center up here in Onalaska, and one in Columbia, Missouri, with a leadership role in putting together the GIS information. Working in an economic structure of agriculture in this basin, it provides an inevitable convergence.

I guess the last question is, well, what kind of management cooperation do we look at? It's discussed at length in the Galloway Report. General Galloway deserves a lot of credit for putting together a document which is expansive in its scope, which is honest in its discussion of all the alternatives and trade-offs in river basin management. It all starts with the Galloway Report.

In sharp relief, the real issue is, once you've coordinated agencies at the Federal level and States have got their act together, what's the balance in terms of making decisions on a State-Federal basis in this basin?

We've never had a satisfactory answer. It's not that we haven't tried. In the 1960s the Water Resource Council and Commissions came and went because the legislation had a kind of New Deal cast to it. It resounded in the ears of some at the Tennessee Valley Authority as a Federal mandate to haul out the planners and have a commission in cookie-cutter style in every watershed in the U.S. And if we get five or six agencies together, the millennium will arrive.

Well, it didn't, and in my judgment, it probably couldn't. The reason is that the American approach to river basin management experience is very different. It's disaggregated, it's split up, and it's grounded in the most intense historical way at the state and local level. And I just don't think that this kind of textbook Harvard-Kennedy School of Government sort of stuff with lots of neat lines and pyramiding authority and decision making really fits the reality.

It's messier and more complex than that. It means to me that, out of the recommendations of the Galloway Report, we'll need something more site-specific, more sophisticated in terms of delineating how to build partnerships, rather than lead horses.

The opportunity is now at hand not to revive any kind of national river basin kind of plan, but to ask: Can we construct a partnership—revive, renew—that builds on the successes we've had, that recognizes the reality of states' interest in these issues?

This perhaps moves toward legislation which talks about the Missouri, the Upper and Lower Mississippi, and creates the conditions for integrating these concerns, for making certain that, henceforth, all the decisions are made in the context of a complete process, with consideration of all the values that are imperative for a sustainable future for this river.

Thank you.



Applying the Principles of Ecosystem Integrity to the Management of the Upper Mississippi River

July 18-19, 1994
La Crosse, Wisconsin

President's Council Recommendations from Workshop Participants

Two-thirds of the responses included recommendations that an ecosystem plan should be completed for the Upper Mississippi River System. This plan should embody the following:

- A strong education component
- Public participation, interagency cooperation, and consideration of all entities related to the river
- A true ecological and economic cost accounting, which includes an evaluation of Federal policies for transportation, agriculture, and other subsidized activities
- A total watershed approach and an analysis of the potential for restoring the natural river hydrograph, floodplain connectivity, and energy dynamics

Quotes

"Listen to the river rats."

"Change the [U.S. Army] Corps [of Engineers]."

"We need a Corps representative on the President's Council so the Corps of Engineers can become proactive on ecosystem integrity."

"Let our actions reflect our love for the river."



What are some of the key principles of ecological integrity?

Over 60% of the responses received included the following as key principles:

- Integration of ecological, economical, and social and cultural values at multiple scales and functions is necessary for achieving ecological integrity.

Ecological values and attributes include the following:

- Diversity (habitat and species)
- A natural state of the ecosystem
- Self-sustainment
- Resilience to disturbance
- Strong human connections
- Protection

Economic and social values and attributes include the following:

- Management of human activities
- Self-sustaining economies
- A vision for the future based on good science

Quotes

“Change is the agent of stability in the long term.”

“Beauty is frequently a characteristic of ecological integrity. It does not need to be designed in by outside forces; it will emerge.”



How will your work change as you apply these principles?

The majority of responders included one or more of the following comments:

- I will consider more things and take a wider, more holistic approach.
- I will do more educating and have more public interaction.
- I will become better focused and informed.
- I will develop goals and plans with an ecosystem-based approach and vision.
- I will expand my network of human and agency interactions.

Of those who felt that nothing would change (15%), a slight majority said there would be no change because they were already applying ecological principles, while the rest felt that there was no chance for change in their work.

Quotes

“Sharing power and giving away power.”

“The Coast Guard mission doesn’t allow consideration of ecological integrity.”

“No change . . . ecological integrity is the same as multiple use—just a new buzzword.”



How will your organization change as it applies these principles?

Over 75% of the responses to this question included one or more of these changes in their organization:

- Better discipline, integration, and social and cultural coordination
- Better planning that will include new priorities
- More educating
- Less focus on site-specific management
- Shift from species management to ecosystem management
- More environmentally conscious
- More responsive to change
- Redistribution of power will decentralize organization and empower workers directly connected to resources

Less than 10% felt that no change was coming in their organization.

Quotes

"We will have less 'work life' versus 'home life' separation."



How will society change as we begin to apply these principles?

80% of the responses to this question included one or more of the following points:

- Society will become better informed on ecology and environmental issues. As society becomes informed, it will recognize the carrying capacity of the environment and come to value sustainability.
- Society will integrate environmental and social values.
- Members of society will become better personal participants in conservation.
- Society will come to recognize that humans are part of the native ecosystem.
- Society will value the natural state of land and water.
- Society will reduce consumption and growth.
- Society will develop a global vision.
- Society will gain in life through a healthier environment and hence a healthier society.

Less than 5% of the responders felt that society would not change.

Quotes

“People will become empowered to affect their destiny.”

“Society will begin to question government policies in transportation and agriculture.”

“Society will recognize it does have a choice.”

“Society will come to value the land and the river as it is, without huge subsidies to maintain an artificial river and floodplain environment.”

What are the next steps?

80% of those responding recommended the following:

An ecosystem plan and vision for the future of the river should be the next step and should be accomplished by a combination of interagency discussions and, most importantly, through a series of public workshops at the local level designed to transfer the information from this conference and workshop to the people and lawmakers of this country.



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