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Managing Mississippi and Missouri River Landscapes: A Conversation with Kenneth R. Olson

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Abstract

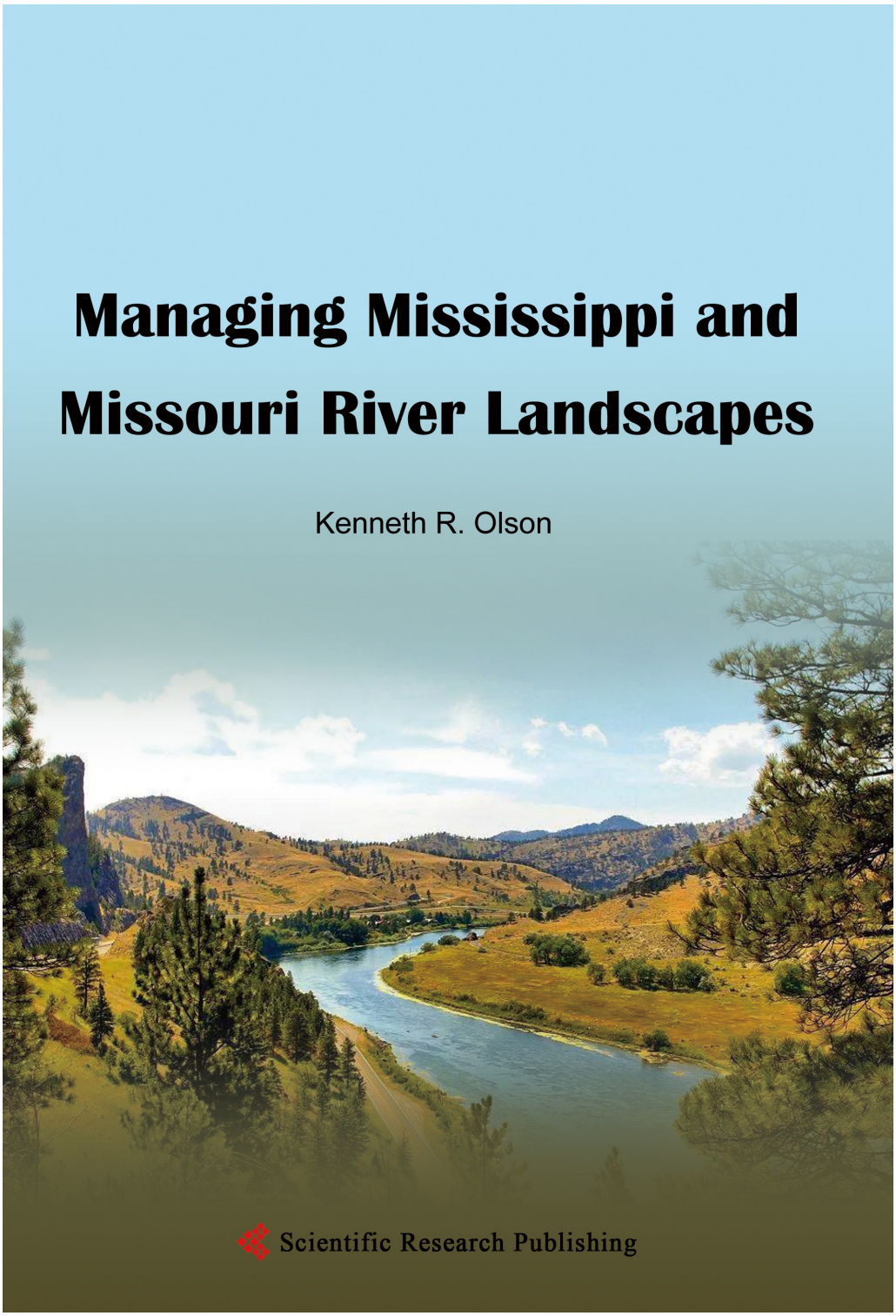
This interview with Kenneth R. Olson discusses the scientific and practical importance of Managing Mississippi and Missouri River Landscapes. The conversation places the Mississippi-Missouri river system within a broader socio-ecological frame: floods, levees, agricultural floodplains, soil erosion, navigation, sediment movement, freshwater degradation, and public health vulnerability. Olson explains how long-term field observations and case studies - from the Middle Mississippi River and the New Madrid Floodway to comparisons with the Kakhovka Dam breach in Ukraine - show that river systems cannot be understood as engineering structures alone. They are living landscapes in which hydrology, soil, land use, policy, and community risk are tightly connected. The interview argues for resilient river management that combines flood protection, ecological restoration, agricultural adaptation, and careful attention to the long-term consequences of pollution and environmental disturbance.

Keywords: Mississippi River; Missouri River; floodplain management; levees; soil erosion; water quality; freshwater systems; pollution; disease ecology; climate variability; river governance; resilience.

Key Points

1. The Mississippi and Missouri River basins are dynamic landscapes shaped by floods, sediment, shifting channels, and human engineering.
2. Levees, locks, dams, reservoirs, and floodways reduce some risks but can create new risks for soils, agriculture, communities, and ecosystems.
3. Long-term soil damage after floods is often less visible than infrastructure damage, yet it can affect crop productivity, water quality, and food security.
4. Effective river management requires resilience: integrated work across hydrology, soil science, ecology, public health, law, and governance.

[1] Corresponding author contact@pollution-diseases.org



Book title	Managing Mississippi and Missouri River Landscapes
Authors	Kenneth R. Olson
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Introduction

Interview conducted on May 27, 2026.

Prepared for the journal "Pollution and Diseases."

Professor Kenneth R. Olson (Figures 1 to 3) is an American soil scientist, environmental researcher, and author whose work focuses on great river landscapes, environmental degradation, flooding, war-related ecological damage, and freshwater systems around the world. In this interview, he reflects on decades of interdisciplinary research, the environmental consequences of war, and the future of the world's great rivers and deltas.

Why This Book Matters Now

River systems are becoming less predictable under climate variability, land-use intensification, aging infrastructure, and rising demand for freshwater. The Mississippi and Missouri Rivers are not only transportation corridors and agricultural engines; they are also field laboratories where the long-term consequences of flood control, soil loss, pollution, and ecosystem simplification can be observed. Olson's book matters now because it turns a familiar U.S. river system into a practical case study for global freshwater management. It shows why decisions about levees, reservoirs, floodways, and agricultural floodplains should not be treated as purely technical choices. They shape public health, livelihoods, biodiversity, and the ability of communities to recover after extreme events.

INTERVIEW

Q: What is this book about?

A: The Mississippi and Missouri River basins occupy more than 20% of the interior continental United States (Figure 1). Their shifting paths have shaped and reshaped the landscapes through which they flow, including the confluences where sediment-laden waters mingle with tributaries on their way to the Gulf of Mexico (called the Gulf of America in current U.S. federal usage). Over millennia, changing climates and extreme weather events have carved new channels through river bottomlands, exposed rock uplands, created fertile valleys, and altered the courses of the Mississippi and Missouri Rivers and their tributaries.

Q: Why did you decide to write this book specifically?

A: In September 2016, I co-authored Managing Mississippi and Ohio River Landscapes (1). During the next decade, I completed 16 additional research studies on the Mississippi and Missouri Rivers. These studies were first published as stand-alone refereed journal articles. I have now summarized, updated, edited, and expanded that work into five book chapters in this new companion volume, Managing Mississippi and Missouri River Landscapes (2).

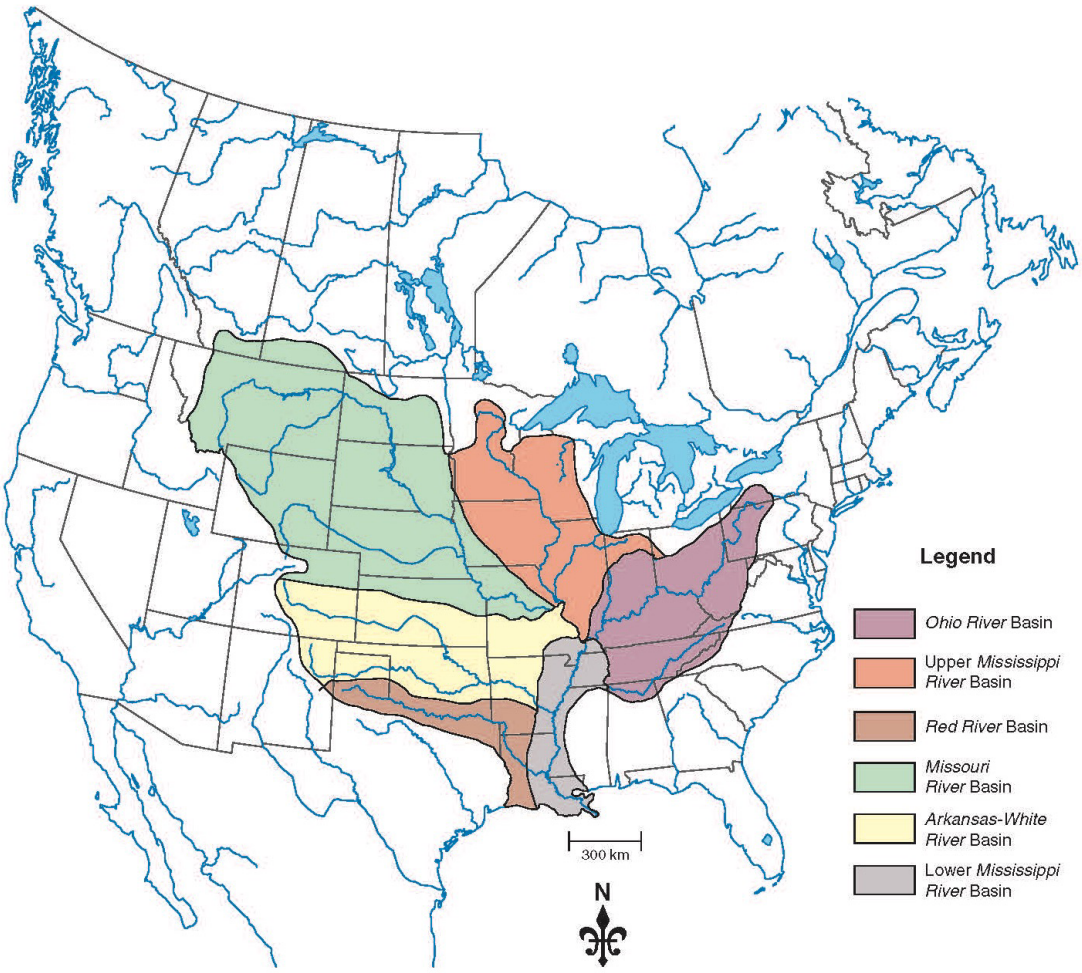

Figure 1. The Mississippi and Missouri River basins and selected tributary watersheds. Map created by Mic Greenberg. Reprinted with the copyright permission of the Editor of the Open Journal of Soil Science.

Q: What makes this topic scientifically important?

A: Great rivers often become state boundaries, and their historic realignment has added land to some states while subtracting it from others. For much of their history, the lands adjacent to these rivers were low-lying bottomlands that flooded seasonally, without the constraint of human structures. During the last century, however, the Mississippi and Missouri Rivers have become major agricultural and navigation corridors. Humans have reengineered the rivers and their bottomlands with levees, locks and dams (Figure 2), floodwalls (Figure 3), reservoirs, and floodways. Through case studies supported by maps and photographs, the book examines these changing river landscapes, reviews the effects of climate, economic growth, population growth, and engineered river management, and offers recommendations for protecting soil and water resources while balancing social, economic, and ecosystem needs.

Figure 2. Olmsted Locks and Dam under construction near the confluence of the Ohio and Mississippi Rivers. Photo credit: Kenneth Olson. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Figure 3. Cairo floodwall with a tugboat visible above the wall during record flood stage. Photo credit: Kenneth Olson. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Q: Which regions or case studies are central to the book?

A: The Middle Mississippi River (3), between the confluence of the Mississippi and Missouri Rivers and the confluence of the Mississippi and Ohio Rivers (Figure 4), is central to the book. I summarized my previous research on the Middle Mississippi in 2025 and first published it as a stand-alone journal article. That article was later expanded into Chapter 3 of Managing Mississippi and Missouri River Landscapes (2). The chapter documents how the geological and landscape resources of the Middle Mississippi River contributed to water-resource and economic development in a historically rich region of North America. It also identifies human-caused, environmental, and natural-resource risks to the basin. The Middle Mississippi has always been prone to flooding, and levees were built to protect both urban and agricultural areas. The New Madrid Floodway was created by the U.S. Army Corps of Engineers (USACE) in the 1930s to reduce flooding near the confluence of the Ohio, Middle Mississippi, and Lower Mississippi Rivers.

Figure 4. A satellite image of the confluence of the Mississippi and Ohio Rivers during the Great Flood of 2011. Photo credit: GeoEye and USDA Farm Service Agency. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Q: What were the most difficult aspects of the research?

A: The most difficult part was gaining access to the New Madrid Floodway immediately after floodwaters had drained. Some roads and fields had gullies about 10 ft deep and 50 ft wide, which could not be crossed by car (Figure 5). Crossing them on foot was also dangerous because floodwater remained in many of the deeper gullies. Often, I had to take long walks simply to get around them.

Figure 5. Deep gullies, 3 m deep, 25 m wide, and 700 m long, were created by water rushing through the levee breach in the New Madrid Floodway. Photo credit: Kenneth Olson. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Q: Did anything during the research surprise you?

A: Yes. Soybean fields without vegetative cover were the most eroded and had the deepest gullies. By contrast, fields planted to wheat, grass, or cover crops showed much less soil erosion and fewer gullies.

Q: Which environmental processes described in the book are the most underestimated?

A: The erosive power of floodwater moving through a levee breach is often underestimated. In the New Madrid Floodway, rushing water created gullies as deep as 3 m, as wide as 25 m, and as long as 700 m. That kind of soil loss is not just a short-term flood mark; it can change drainage, field access, and long-term productivity.

Q: How are environmental systems connected with political or military processes in this topic?

A: The U.S. Army Corps of Engineers (USACE) has federal responsibility for managing many of the major river-engineering functions of the United States. Navigation is often the top operational priority, followed by flood-risk reduction. Environmental effects are considered, but they may become secondary when an emergency decision must be made. That is why river management is never purely technical: it is also political, economic, legal, and ecological.

Q: What should readers understand after reading this work?

A: Much can be learned by observing and studying the human and natural systems of river landscapes together. I framed the book as a series of short case studies about leveed agricultural lands, river navigation, upland reservoirs, and flood-risk management on the Mississippi and Missouri Rivers. Together, these stories show that change is the only certainty in river systems. Soil and water connectivity creates both vulnerability and opportunity. People also differ greatly in how they value and use river landscapes. Managing for resilience is the best way to prepare for future risks and catastrophes that cannot be fully predicted.

The book also connects these case studies to the broader themes of pollution, disease, and the global freshwater crisis. It does not treat rivers only as hydrological or economic infrastructure. Instead, it views large river systems as socio-ecological corridors that shape long-term environmental exposure and public-health risk. Particular attention is given to anthropogenic pollution, land-use decisions, floodplain management, freshwater quality, and disease-related vulnerability. The discussion also considers how chemical contamination may alter aquatic microbial communities and influence pathogen behavior. In this sense, the Mississippi River case becomes a model for broader questions about freshwater degradation, health risk, and the need to integrate hydrology, ecology, epidemiology, and governance.

Q: Who is this book intended for?

A: The book will be useful for public and private landowners, river managers, and agencies working with Mississippi and Missouri River landscapes. It will also interest soil scientists, sociologists, conservationists, wetland specialists, human and physical geographers, urban planners, public-health specialists, economists, geomorphologists, geologists, hydrologists, agronomists, foresters, and readers who simply care about rivers.

Q: Which chapter is personally most important to you?

A: Chapter 3, "Middle Mississippi River: A Critical Transportation, Flooding and Ecological Corridor Needs Mitigation and Restoration," is especially important to me. The Middle Mississippi River has contributed to the successful water-resource and economic development of a historically rich region in North America, but it also shows the tension between navigation, flood protection, agriculture, ecology, and restoration.

Q: How does this book relate to current global environmental challenges?

A: The Mississippi and Missouri River studies by Olson and colleagues provide a strong foundation for understanding how large freshwater systems mediate pollution and disease dynamics. Their value lies not only in empirical detail, but also in showing the structural and historical roots of contemporary health risks. As global freshwater stress intensifies, this body of work offers useful insights for rethinking river governance, environmental responsibility, and public-health resilience

Q: Are the problems discussed in the book improving or worsening today?

A: In the United States, many levee-breach problems have been addressed either by rebuilding levees higher and stronger or by removing buildings and changing land use through easements. One example is Dogtooth Bend in southern Illinois, where the USACE stopped repairing repeated levee breaches and left an opening in the levee. Whenever the Mississippi River reaches flood stage, water covers much of Dog-tooth Bend and continues to cut a channel across the peninsula. The State of Illinois purchased and removed many buildings not protected by private farmstead levees. Conservation organizations also paid farmers, through easements, to stop producing crops and return parts of the floodplain to wetlands and floodwater storage. In that setting, the natural floodplain and wetlands are now being used to store floodwater during future Mississippi River flood events.

In other parts of the world, especially where wars and conflicts are ongoing, the problems are worsening. The Kakhovka Dam on the Dnieper River was destroyed in 2023 during the Russia-Ukraine war, and the affected water, irrigation, and ecological systems require urgent assessment and careful restoration planning (4). Lessons learned by the USACE after the induced 2011 Birds Point levee breach on the Mississippi River may help inform analysis of the induced Kakhovka Dam breach. At Birds Point-New Madrid, floodwater destroyed crops, damaged future soil productivity, created deep gullies, displaced large volumes of soil, and damaged irrigation equipment, farms, and homes. Those agricultural lands were later restored, and environmental damage was mitigated. The Kakhovka case is more complex because flooding affected settlements and farmland across the Dnieper watershed, and the redistribution of Chernobyl - derived radionuclides created an additional risk that was not present at New Madrid

Q: Which future research directions emerge from this work?

A: I plan to expand my research beyond the Mississippi River and its tributaries to include great river landscapes in North America and around the world.

I also plan to take the historical lessons from induced levee breaches and apply them to the Dnieper watershed in Ukraine and Russia. The goal is not to claim that the cases are identical, but to use earlier field evidence to ask better questions about restoration, soil damage, water security, and long-term risk

Q: How could climate change and increasing climate variability affect flood frequency, drought, sediment movement, soil erosion, agricultural productivity, and the reliability of levees and floodways?

A: Climate change and weather extremes are putting the entire Mississippi and Missouri River system and its tributaries at risk. More intense rainfall can increase flood frequency and pressure on levees and floodways. Drought can reduce navigation depth, concentrate pollutants, and disrupt sediment movement. Both extremes can accelerate soil erosion and make agricultural planning less reliable. For farmers and

river managers, the central issue is resilience: soils, channels, levees, and floodways must be able to absorb disturbance and recover.

Q: Why is long-term soil damage after floods less visible, and why should scientists and policymakers give it more attention??

A: Long-term soil damage is less visible because a field may look usable once the water recedes. Yet scouring, sand deposition, compaction, loss of topsoil, and altered drainage can reduce productivity for years. Flooding can affect both commodity crops and food crops. In vulnerable regions, repeated flood damage can therefore become a food-security issue, not only an agricultural-management problem.

Q: How did flood-control decisions affect farmers and local communities, and were their voices adequately considered?

A: The use of the Birds Point-New Madrid Floodway in 2011 adversely affected Missouri farmers. Because it was a federal floodway, original landowners had signed easements, first in the 1930s and later in the 1960s, giving the USACE the right to pass floodwater across their land during extreme events. Yet the floodway had not been used for decades, and many farmers no longer perceived flooding as a lifetime risk. Some had stopped buying crop-flood insurance. After sediment was removed from drainage ways, many fields dried enough for farmers to plant soybeans in 2011, but the wheat crop planted in autumn 2010 was lost. This case shows that legal authority and lived experience are not the same thing: communities need to be part of risk communication long before an emergency decision is made.

Q: What does this book reveal about the limits of expertise in managing large river systems?

A: By 1926, the USACE had built levees from New Orleans to Cairo and publicly declared that the Mississippi flood threat was under control. Then intense rainfall in the Ohio River watershed contributed to the Great Flood of 1927. Many levees failed, transportation was disrupted, and hundreds of people living and working on the Ohio and Lower Mississippi floodplains died. John M. Barry later told this story in Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America (5). The lesson is not that expertise is unimportant. It is that expertise has limits when it is organized around a single strategy. After 1927, the USACE moved away from a levees-only approach and toward a more diversified system of floodways, spillways, reservoirs, and other controls.

Q: If you could recommend one major change in river and floodplain management policy based on this book, what would it be?

A: Managing for resilience is the best way to prepare for future risks and catastrophes that cannot be fully predicted. That means combining engineered protection with floodplain storage, wetland restoration, soil conservation, transparent risk communication, and long-term monitoring.

Q: If readers remember only one idea from the book, what should it be?

A: Change is the only certainty in river systems.

Q: What role should restoration play alongside flood protection?

A: Restoration should not be treated as the opposite of flood protection. In many floodplain settings, wetlands, side channels, and designated storage areas can reduce pressure on levees while improving habitat and water quality. The practical challenge is to decide where hard infrastructure is necessary and where giving water more room can make the system safer and more resilient.

Q: How should the book be read by people outside the United States?

A: The Mississippi and Missouri examples are local, but the lesson is global. Large rivers everywhere combine navigation, agriculture, settlement, biodiversity, and political responsibility. When managers ignore one part of that system - soil, sediment, public health, or community risk - the consequences often appear decades later.

Q: What makes field observation especially important in this research?

A: Field observation reveals damage that cannot be understood from policy documents or short-term flood reports alone. After a levee breach, the obvious losses are buildings and roads, but walking the floodway shows the less visible effects: scoured fields, sand deposits, gullies, changed drainage, and soils that may need years to recover.

Q: What is the most urgent message for policymakers?

A: River policy needs to move from crisis response to long-term adaptation. That means planning for floods and droughts together, protecting navigation without sacrificing ecosystems, and treating soil and water as one connected resource.

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The Editorial Board of the journal "Pollution and Diseases" wishes you continued scientific success, new discoveries, and inspiration in your work.

Conflict of Interest

The authors declare no conflict of interest.

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Data Availability Statement

No new data were created or analyzed in this study.

References

1. Olson, K. R., & Morton, L. W. (2016). Managing Mississippi and Ohio River Landscapes. Ankeny, IA: Soil and Water Conservation Society. 240 pp. ISBN 978-0-

9856923-1-5. https://www.swcs.org/resources/publications/managing-mississippi-and-ohio-river-landscapes

2. Olson, K. R. (2025). Managing Mississippi and Missouri River Landscapes. Scientific Research Publishing. 278 pp. ISBN 979-8-89507-746-7 (paperback); ISBN 979-8-89507-747-4 (e-book). https://www.scirp.org/book/detailedinforofabook?bookid=3182

3. Olson, K. R. (2025). Middle Mississippi River: A Critical Transportation, Flooding, and Ecological Corridor Needs Mitigation and Restoration. Open Journal of Soil Science, 15, 646-690. https://doi.org/10.4236/ojss.2025.159029

4. Olson, K. R. (2024). Environmental Impact of Kakhovka Dam Breach and Chornobyl Nuclear Power Plant Explosion on Dnieper River Landscape. Open Journal of Soil Science, 14, 353-387. https://doi.org/10.4236/ojss.2024.146020

5. Barry, J. M. (1997). Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America. New York, NY: Simon & Schuster.