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

Editorial board[1]

Pollution and Diseases

DOI: https://doi.org/10.66659/0nae6h81

Published: May 23, 2026

How to cite: Editorial board. Managing Mississippi and Ohio River Landscapes: A Conversation with Kenneth R. Olson. Pollution and Diseases. Repository. 2026. 12 p.

DOI: https://doi.org/10.66659/0nae6h81

Abstract

This interview with Kenneth R. Olson focuses on Managing Mississippi and Ohio River Landscapes, a book devoted to the environmental, agricultural, historical, and engineering dimensions of two major US river systems. The conversation highlights the 2011 Great Flood, the New Madrid Floodway, the deliberate Birds Point levee breach, the effects of flood-control decisions on agricultural land, and the long-term consequences of erosion, land scouring, sediment deposition, and soil productivity loss. The interview also places the book in a wider context of climate variability, floodplain conversion, damaged hydraulic infrastructure, and war-related environmental risks in other river basins.

Keywords: Mississippi River; Ohio River; New Madrid Floodway; Birds Point levee breach; 2011 Great Flood; floodplain management; soil productivity; agricultural land; river engineering; U.S. Army Corps of Engineers; land scouring; environmental recovery; climate variability; Dnieper watershed; war-related environmental impacts.

Key Points

1. River management is simultaneously an engineering, agricultural, environmental, legal, and political problem.
2. The 2011 New Madrid Floodway case shows how a flood-control decision can create long-term consequences for soil productivity and farm landscapes.
3. The Birds Point levee breach demonstrates the underestimated erosive power of water moving through a deliberately opened levee system.
4. Field-based soil observation is essential for documenting damage that may not be captured by routine surveys or immediate disaster assessments.
5. Historical lessons from managed river landscapes can inform contemporary discussions of climate variability, damaged hydraulic infrastructure, floodplain recovery, and war-related environmental risk.

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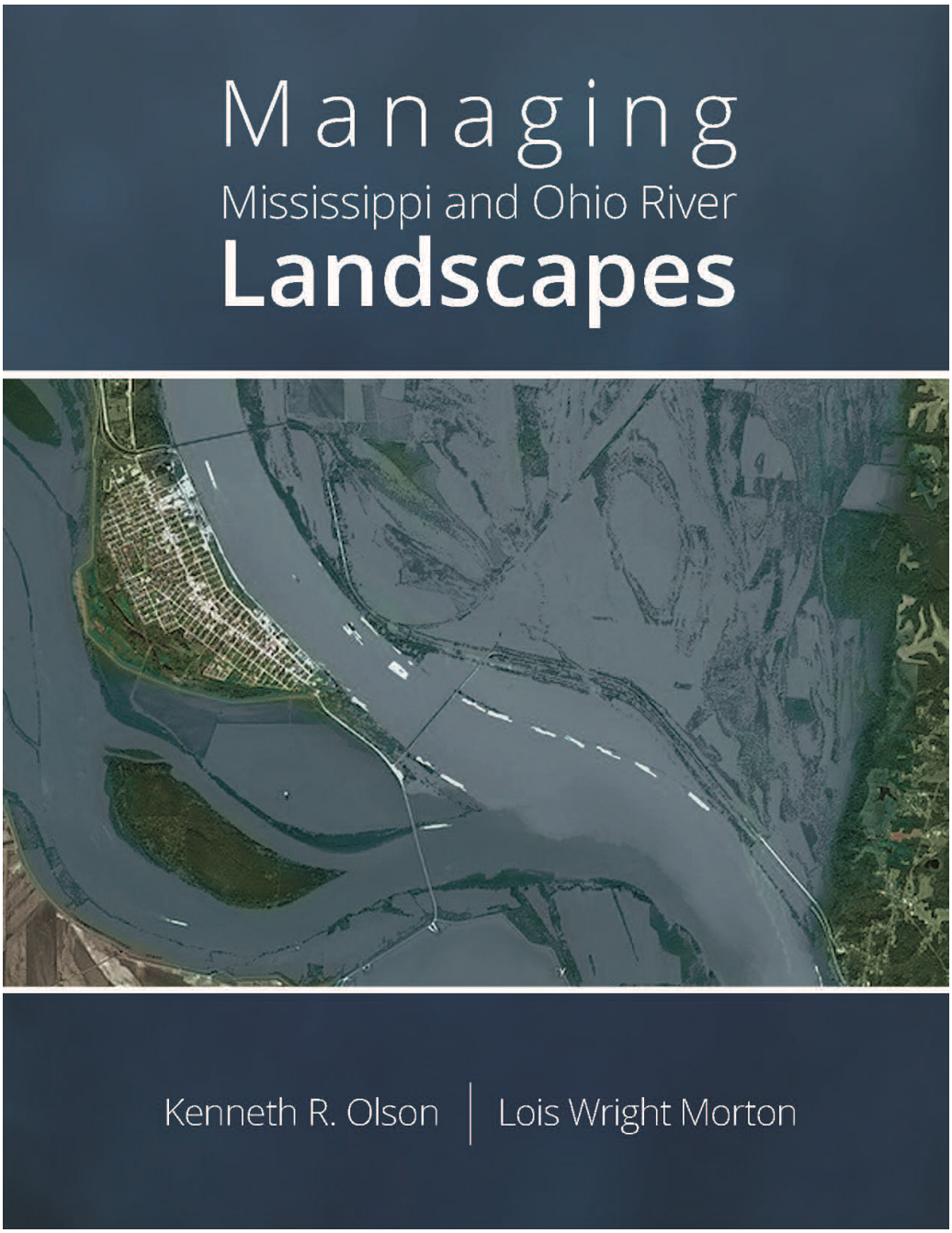

Book title	Managing Mississippi and Ohio River Landscapes
Authors	Kenneth R. Olson and Lois Wright Morton
Year	2016
Publisher	Soil and Water Conservation Society, Ankeny, Iowa
ISBN	978-0-9856923-1-5
Pages	223 pages

"Change is the only certainty in river systems."
Kenneth R. Olson

Introduction

Interview conducted on May 16, 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

This interview is one installment in a planned editorial series devoted to Kenneth R. Olson's books on river landscapes, soils, freshwater systems, environmental change, and environmental risks. This installment examines Managing Mississippi and Ohio River Landscapes, with a focus on floodplain management, levees, river engineering, agricultural soils, and the consequences of the 2011 Great Flood (1).

The book remains timely because flood-control decisions are never purely technical. They influence agricultural productivity, soil conservation, environmental recovery, public safety, legal conflict, and long-term land-use planning. The New Madrid Floodway and the Birds Point levee breach offer a concrete example of how federal authority, farmland, river hydraulics, and soil damage converged in one river-management case.

The interview also links these regional lessons to broader issues: floodplain conversion, damaged hydraulic infrastructure, wartime environmental consequences, and the need for more resilient management of river landscapes. In this sense, a U.S. case study can speak to wider debates, including the Dnieper watershed.

INTERVIEW

Q: What story does this book tell about the Mississippi and Ohio Rivers?

A: This book tells the story of the Mississippi and Ohio Rivers and the landscapes shaped by them (Figure 1). We interpret the language of the rivers and their management through the eyes of a soil scientist and a social scientist. Most importantly, we explain complex human and natural relationships in terms that both scientists and non-scientists can understand.

Demand for soil and water resources continues to increase, and wise land-use planning often requires balancing diverse and conflicting goals. These issues require technical expertise as well as a human touch. The book brings historical background, a unique perspective, and practical insight to current problems and future opportunities associated with these two great rivers.

A book of this scope is not meant to be read once and set aside. It should be revisited over time. As the young steamboat pilot Mark Twain observed, these rivers have "a new story to tell every day."

Figure 1. The location of the Mississippi and Ohio River and tributary basins, which occupy 41% of the continental United States. Map created by Mic Greenberg. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Q: What led you to write this book at that particular moment?

A: After the 2011 Great Flood (Figure 2), we assessed soil damage along the Mississippi and Ohio Rivers and their tributaries. The most significant levee breaches occurred near the confluence of the Ohio and Mississippi Rivers, within the New Madrid Floodway in Missouri. The greatest soil damage occurred there after the U.S. Army Corps of Engineers used TNT to open the Birds Point levee (Figure 3). The event drew national attention and renewed our interest in great river and delta landscapes.

Figure 2. 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.

Figure 3. The first of three Birds Point levee breaches was triggered using TNT by the U.S. Army Corps of Engineers. The crater lake is between the levee and the adjacent farmland. Photo credit: Kenneth Olson. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Q: Why is this case scientifically important?

A: The Birds Point decision is scientifically important because it links hydrology, river engineering, law, agriculture, and soil productivity in one case. The U.S. Army Corps of Engineers opened the Birds Point levee to reduce pressure on the floodwall and levees protecting Cairo, Illinois (3), and to prevent the possibility of catastrophic failure of the levee system.

The legal challenge did not prevent USACE from opening the floodway, but the four-day delay resulted in river water levels approximately 4 ft higher than expected and increased the erosive power of water moving through the induced breach. As a result, Missouri agricultural lands experienced more soil damage than USACE had anticipated (Figures 4).

Figure 4. The first of three Birds Point levee breaches was triggered using TNT by the U.S. Army Corps of Engineers. The crater lake is between the levee and the adjacent farmland. Photo credit: Kenneth Olson. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Q: Which case study anchors the book most strongly?

A: Chapter 10, "The Impacts of 2011 Man-Induced Levee Breaches on Agricultural Lands of the Mississippi River Valley" (2), is the key chapter.

Controlling the Mississippi River is a mighty task, and the 2011 flood of its alluvial valley demonstrated how difficult that task can be. Heavy snowmelt and rainfall, far above average across the eastern half of the 200,000-square-mile Mississippi watershed, produced one of the most powerful floods in the river's known history (Figure

5). Water from the Mississippi and Ohio Rivers reached the Cairo, Illinois, area at about the same time, straining the levees and floodwall system designed to confine the rivers and protect cities and farmlands.

The deliberate breaching of the New Madrid Floodway levees in May 2011 was intended to reduce water pressure and prevent levee failures in places where human life might be at risk. Flooding of 133,000 acres of Missouri farmland caused the loss of 2011 crops and damaged future soil productivity. The current through the Birds Point levee breaches created deep gullies, displaced tons of soil, and damaged irrigation equipment, farms, and homes.

Figure 5. An 80-ha soybean field surrounded by trees. Approximately 40% of the field was lost due to huge, wide, deep, and long gullies. Photo credit: USDA Farm Service Agency. Reprinted with copyright permission of the Editor of the Open Journal of Soil Science.

Q: What was most difficult about the field research?

A: The most difficult task was gaining access to the New Madrid Floodway after the floodwaters had subsided. Some roads and fields were cut by gullies as deep as 10 ft and could not be crossed by car. I often had to walk long distances around the gullies. Entering them was dangerous because floodwater was still ponded in many of the deepest cuts.

Q: What surprised you most in the field?

A: The severity of erosion in soybean fields surprised me. These fields were the most eroded and contained the deepest gullies. By contrast, there was very little erosion and gully formation in fields planted to wheat, grass, or cover crops.

Q: Which environmental process is most often underestimated in cases like this?

A: The erosive power of water flowing through a levee breach is often underestimated, especially when that water moves rapidly across agricultural soils.

Q: What role do public authorities and engineering priorities play in river management?

A: The U.S. Army Corps of Engineers (USACE) has federal responsibility for managing the great rivers of the United States. Navigation is its top priority, followed by flood reduction. Environmental impacts are often treated as a secondary consideration.

Q: What should readers understand after finishing the book?

A: The central lesson is that much can be learned by observing and studying the human and natural systems of river landscapes. We framed the book as a set of short case studies on leveed agricultural lands, river navigation, upland reservoirs, and landscape management for flood risk.

Together, these stories show that change is the only certainty in river systems. Soil and water are connected in ways that create both vulnerability and opportunity. People also differ greatly in how they imagine, use, and value river landscapes. Managing for resilience is therefore the best way to prepare for future risks and catastrophes that cannot be fully predicted.

Q: Who should read this book, and why?

A: The book will be useful to public and private landowners and managers in the Mississippi and Ohio River landscapes. It should 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 with a general interest in rivers. Each of these readers encounters a different part of the same river-landscape problem.

Q: Which chapter is most personal or important to you?

A: Chapter 13, "Impact of Levee Breaches on Flooding and Land Scouring on O'Bryan Ridge Soil Productivity" (4), is personally the most important to me.

Levees protect public and private lands from periodic flooding. However, when they fail naturally or are deliberately breached, the consequences can be severe and long-lasting. Damage can include crop loss, levee damage, crater lakes, gullies, thick sand deposits, land scouring, destruction of irrigation equipment, degradation of soil and water, damage to buildings and farmsteads, blocked drainage and road ditches, road deterioration, and ecological damage to forests, parklands, and wetlands.

The effects of levee breaches and flooding on soils and soil productivity are seldom documented in detail because updated soil surveys are not routinely made after such events. In the case of the O'Bryan Ridge gully field, the damage included the permanent loss of about 30% of agricultural productive capacity as a result of land-use conversion, land scouring, water erosion, and gully formation. Because floodwaters

drained quickly from the field, there was little sediment deposition except for 21 acres of ponds at the bottom of the deep gullies.

Q: How does this regional river case connect to global environmental challenges?

A: Flooding is a worldwide management problem, especially as floodplains are converted from wetlands to agricultural and urban land uses. Managing the great river and delta landscapes of the world is therefore a major environmental challenge.

The historical lessons from Managing Mississippi and Ohio River Landscapes can also be applied to other river systems, including the Dnieper watershed in Ukraine and Russia.

Q: Are the challenges described in the book becoming easier to manage, or are they worsening?

A: In the United States, many levee-breach issues have improved because damaged systems have been rebuilt with higher and stronger levees, or because buildings have been removed and land use has been changed through easements. Dogtooth Bend in southern Illinois is one example (5). There, USACE stopped repairing repeated levee breaches; the State of Illinois purchased and removed most buildings not protected by private farmstead levees; and conservation organizations used easements to encourage farmers to stop producing crops and return parts of the floodplain to wetlands and floodwater storage.

In other parts of the world, especially where wars and conflicts are ongoing, the problems are worsening. The destruction of the Kakhovka Dam on the Dnieper River during the Russia-Ukraine war caused widespread flooding that affected settlements and farmland across the Dnieper watershed. Lessons from the 2011 Birds Point levee breach may be relevant to understanding such human-induced hydraulic failures, although the Dnieper case has additional complications, including the presence and breach-induced redistribution of Chernobyl-derived radionuclides. Those conditions were not present in the New Madrid Floodway case.

Q: What future research directions grew out of this work?

A: This work led me to expand my research on the Mississippi River to include the Lower Mississippi River and the Mississippi River Delta. I also traveled to the headwaters of the Mississippi River and traversed the Missouri River, the longest river in North America. I completed and summarized my previous research on the Middle Mississippi in 2025 and published it as a chapter in the companion book Managing Mississippi and Missouri River Landscapes (6).

I also decided to apply the historical lessons from man-induced levee breaches to the Dnieper watershed in Ukraine and Russia.

Q: The book was published about a decade ago. Looking back, would you write the same book today, or would you revise some chapters, conclusions, or case studies considering new data, recent floods, climate variability, land-use change, and policy experience?

A: No. I would not have changed the book. However, I would have combined it with the companion book Managing Mississippi and Missouri River Landscapes (6). The combined title would have been Managing Mississippi, Ohio, and Missouri River Landscapes. However, that would have delayed the final publication of the book by ten years, since I would have needed to complete additional boots-on-the-ground trips on the Mississippi and Missouri Rivers. By then, I would have lost all institutional support and funding.

Q: Climate change and increasing climate variability are making river systems less predictable in many parts of the world. How might these changes affect the Mississippi and Ohio River basins, especially flood frequency, drought risk, sediment movement, soil erosion, agricultural productivity, and the long-term reliability of levees and floodways?

A: Climate change and weather extremes are putting the entire Mississippi River system and its tributaries at risk. These changes can increase both flood and drought risk, alter sediment movement, intensify soil erosion, reduce agricultural productivity, and place additional stress on the long-term reliability of levees and floodways.

Q Q: After major floods, public attention usually focuses on immediate damage to homes, roads, and public infrastructure. Why is long-term soil damage less visible, and why should scientists and policy-makers give it more attention?

A: Long-term impacts of flooding on soils can affect soil productivity for many years. Flooding can reduce crop production by causing erosion, sediment deposition, compaction, and drainage problems. Because these effects may appear only in later growing seasons, they receive less attention than immediate damage to buildings and roads. They should be considered by scientists and policy-makers because persistent soil degradation can become a long-term issue for agriculture and food security[2].

Q: How did flood-control decisions affect farmers and local communities in the Mississippi and Ohio River basins, and were their voices adequately considered in the decision-making process?

A: The use of the New Madrid Floodway in 2011 adversely affected Missouri farmers. However, it was a federal floodway, and when its easements were secured after the Great Flood of 1927, original landowners were compensated for the use of the floodway during flooding events. The floodway had last been activated in 1937 and was not used again until 2011. Many farmers had therefore stopped purchasing crop flood insurance because the land had not been flooded during their lifetimes. After sediment was removed from the drainageways, most of the field area dried enough for farmers to plant soybeans in 2011. However, the wheat crop planted in fall 2010 drowned.

[2] **Editorial note:** The long-term interpretation of flood-related soil change, including its relevance for contaminant redistribution and environmental health, extends beyond the scope of this interview and will be addressed separately.

Q: Your book shows that river management is not only a scientific or engineering problem, but also a political, legal, economic, and social one. Even in a country with advanced science and strong public institutions, decisions about levees, floodways, agriculture, and urban protection can have unintended consequences. What does this reveal about the limits of expertise in managing large river systems?

A: By 1926, USACE had built levees from New Orleans to Cairo and publicly declared that Mississippi River flooding was under control. However, in late 1926 it started to rain in the Ohio River watershed, and eventually all but one bridge crossing the Ohio River was either damaged or made unusable by floodwaters. When the floodwater reached the Mississippi River, it caused many levee breaches and resulted in the deaths of hundreds of people living and working on the Ohio and Lower Mississippi River floodplains. The story of the 1927 flood later became the subject of John M. Barry's 1997 book, Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America, published by Simon & Schuster (7). After the flood of 1927, USACE moved away from its "levees only" strategy to prepare for future flooding events.

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 therefore the best way to prepare for future risks and catastrophes that cannot be fully predicted.

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

A: Change is the only certainty in river systems.

*****

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.

Acknowledgments

Not applicable.

Funding

This research received no external funding.

Data Availability Statement

No new data were created or analyzed in this study.

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