

St. Lawrence Seaway: Canada and United States Joint Lifeline (A Conversation with Kenneth R. Olson)

Editorial board¹

Pollution and Diseases

DOI: <https://doi.org/10.66659/7ghvm975>

Published: June 4, 2026

How to cite: Editorial board. St. Lawrence Seaway: Canada and United States Joint Lifeline (A Conversation with Kenneth R. Olson). Pollution and Diseases. Repository. 2026. 12 p.

DOI: <https://doi.org/10.66659/7ghvm975>

Abstract

This interview with Professor Kenneth R. Olson discusses his book *St. Lawrence Seaway: Canada and United States Joint Lifeline*, which examines the Great Lakes–St. Lawrence River–Seaway system as a connected freshwater, navigation, landscape, and environmental management system linking the inland Great Lakes with the Atlantic Ocean. The conversation highlights the historical and contemporary importance of the St. Lawrence Seaway for Canada and the United States, including its role in transportation, settlement, trade, water governance, and environmental change. Professor Olson explains how climate variability, hydrology, geomorphology, engineering infrastructure, agricultural development, shoreline erosion, flooding, invasive species, and pollution legacies have shaped the region over time. The interview also connects freshwater systems with industrial and military history, including the production and transport of Agent Blue and arsenic contamination associated with the Menominee River. Particular attention is given to the need for resilience-based river and floodplain management, long-term soil and water protection, infrastructure maintenance, and integrated research on climate change, public health, and freshwater systems. The central message of the interview is that change is the only certainty in river systems.

Keywords: St. Lawrence Seaway; Great Lakes; St. Lawrence River; freshwater systems; river landscapes; soil and water resources; shoreline erosion; flood risk; climate variability; water pollution; navigation infrastructure; Agent Blue; arsenic contamination; environmental management; public health resilience.

Key Points

1. The Great Lakes–St. Lawrence River–Seaway system is a binational freshwater and navigation corridor linking Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario with the Atlantic Ocean.

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2. The book presents the St. Lawrence Seaway as both a natural and engineered landscape shaped by climate, hydrology, geomorphology, settlement, trade, agriculture, navigation, and governance.
3. Professor Olson emphasizes that river and lake landscapes must be understood as coupled human–natural systems, where engineering decisions, economic development, and environmental change interact over long periods.
4. The main case studies discussed in the interview include leveed agricultural lands, river navigation, upland reservoirs, shoreline erosion, flood risk, and management of the St. Lawrence River system.
5. The interview identifies several underestimated environmental processes: large-scale settlement, navigation and channel modification, treated and untreated wastewater disposal, water pollution, high-water levels, shoreline erosion, invasive species, and flooding.
6. The discussion connects freshwater systems with military and industrial logistics through the example of Agent Blue, an arsenic-containing herbicide manufactured near the Menominee River and transported through the Great Lakes, St. Lawrence Seaway, Atlantic Ocean, Panama Canal, and Pacific Ocean toward Southeast Asia.
7. The St. Lawrence Seaway case demonstrates how freshwater transport systems, industrial production, military supply chains, and long-term contamination can become part of the same environmental history.
8. Climate change and increasing climate variability may intensify flood frequency, drought risk, shoreline erosion, sediment movement, contaminant remobilization, soil degradation, and stress on levees, dams, floodways, and navigation infrastructure.
9. Professor Olson argues that resilience should be placed at the center of river and floodplain management, including long-term planning, wetland and floodplain protection, pollution reduction, infrastructure maintenance, monitoring, and adaptive governance.
10. The main concluding idea of the interview is that change is the only certainty in river systems.

Introduction

Interview conducted on June 04, 2026.

Prepared for the journal “Pollution and Diseases.”

Professor Kenneth R. Olson 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.

St. Lawrence Seaway: Canada and United States Joint Lifeline

Edited by Kenneth R. Olson



Book title	St. Lawrence Seaway: Canada and United States Joint Lifeline
Authors	Kenneth R. Olson
Year	2025
Publisher	BP International
ISBN	ISBN 978-93-88417-36-5 92 p. (Print) ISBN 978-93-88417-86-0 (eBook)
Pages	92 p.

Why This Book Matters Now

This book matters now because the Great Lakes–St. Lawrence River–Seaway system is not only a navigation corridor, but also a living freshwater landscape, an engineered infrastructure system, an economic artery, and a shared environmental responsibility of Canada and the United States. Kenneth R. Olson shows that large river and lake systems are shaped by the interaction of climate, hydrology, soils, settlement, trade, engineering, pollution, and governance. The book is timely because climate variability, shoreline erosion, flooding, invasive species, pollution legacies, and aging infrastructure are making the future of such systems increasingly uncertain. Its main contribution is to place resilience at the center of river and floodplain management and to show that the history of the St. Lawrence Seaway offers lessons for freshwater governance, environmental protection, and public health far beyond one region.

INTERVIEW

Q: What is this book about?

A: This book examines the Great Lakes-St. Lawrence River-Seaway system (Figure 1) as a connected freshwater, navigation, and landscape system linking western Lake Superior with the Atlantic Ocean.

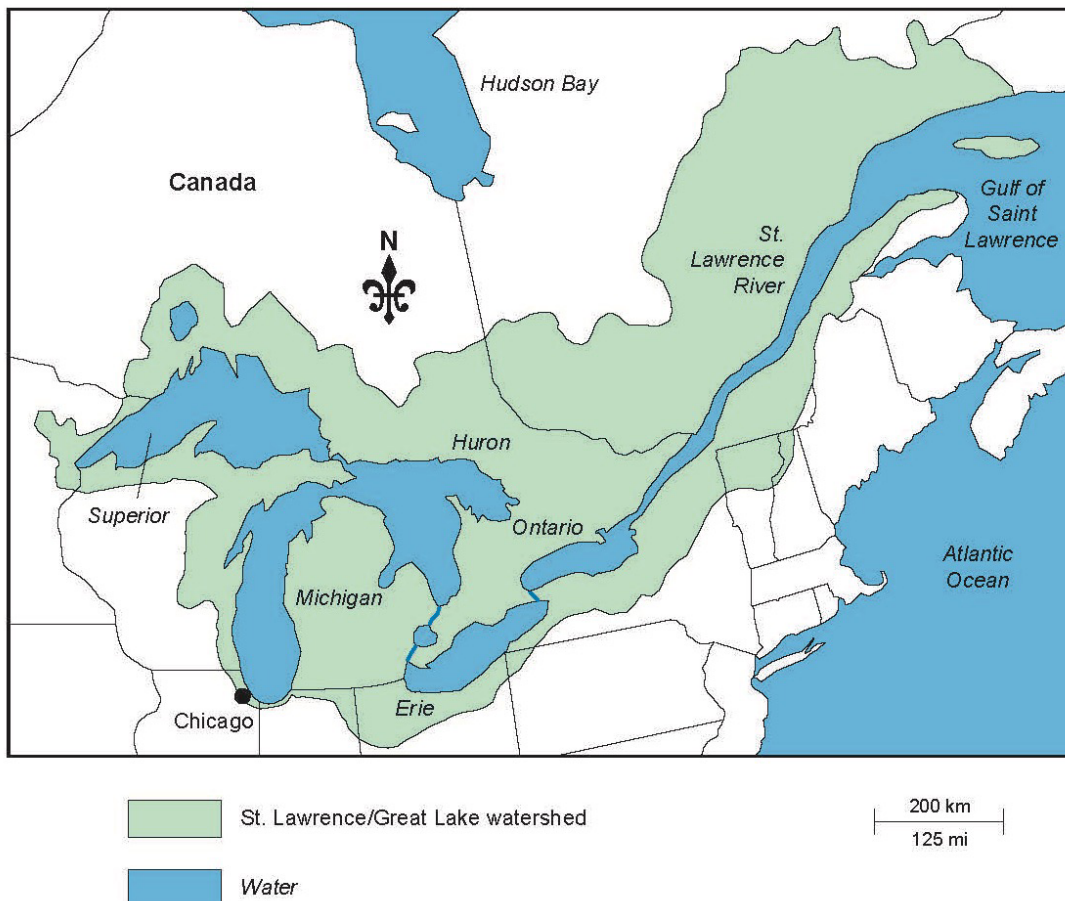


Figure 1. St. Lawrence/Great Lakes watershed and the Great Lakes-St. Lawrence River-Atlantic Ocean waterway. Map created by Mic Greenberg. Reprinted with copyright permission from the Managing Editor of the Open Journal of Soil Science.

The Great Lakes drain through the St. Lawrence River and the St. Lawrence Estuary before reaching the Atlantic. Water originating in the Lake Superior watershed (Figure 2) moves through the Great Lakes, connecting rivers, and the St. Lawrence River before discharge to the Atlantic Ocean. Over millennia, climate variability and extreme weather have carved new channels, exposed rock uplands, formed fertile valleys, and altered river alignments. Because major rivers often become national, provincial, or state boundaries, historical realignments can add or remove land from bordering jurisdictions. For much of their history, adjacent lands were low-lying bottomlands that flooded seasonally. During the last century, however, these river and lake landscapes have also become agricultural and economic engines as people re-engineered them with levees, locks, dams, floodwalls, reservoirs, and related infrastructure. Through case studies, maps, and photographs, the book examines the St. Lawrence River landscape and its systems (1), reviews the historical effects of climate, economic growth, population growth, navigation, and engineered river management, and offers recommendations for protecting soil and water resources while supporting social, economic, and ecosystem balance.

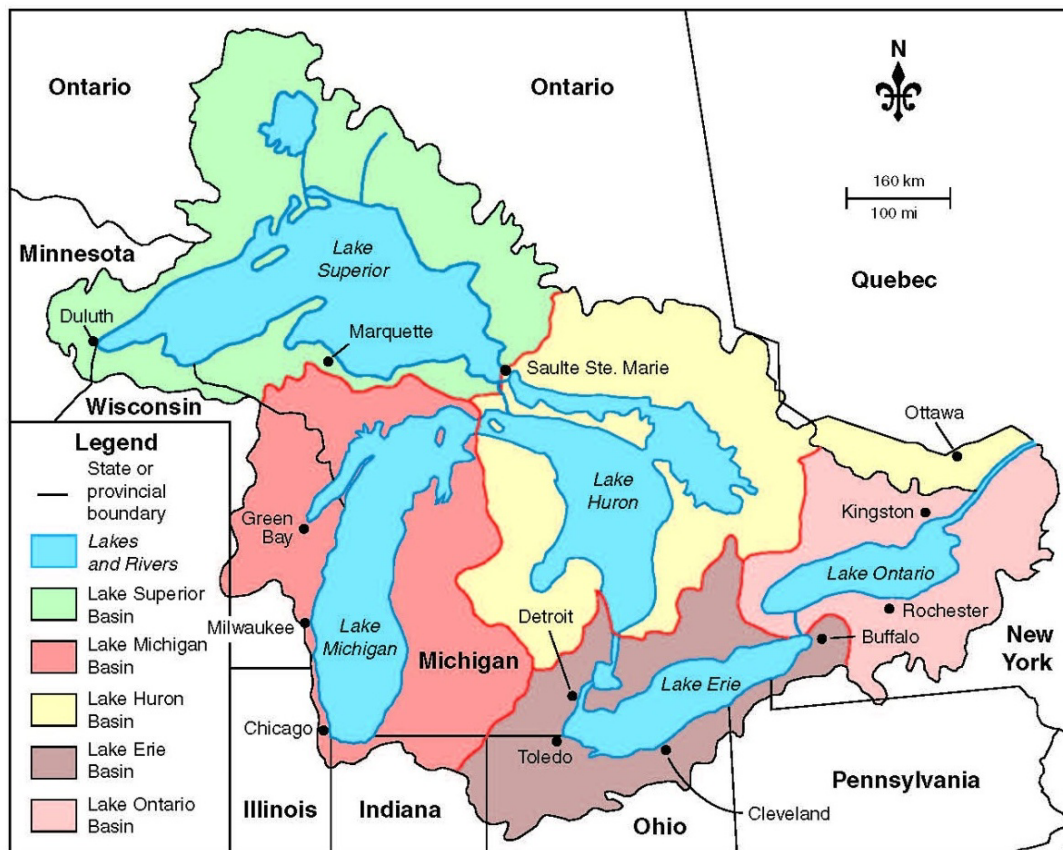


Figure 2. The Great Lakes basin and individual lake sub-basins. Map created by Mic Greenberg. Reprinted with copyright permission from the Managing Editor of the Open Journal of Soil Science.

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

A: While researching the Erie Canal and the New York State Canal System, I repeatedly encountered references to the competing northern route, the St. Lawrence Seaway (2). The Erie Canal was built entirely within New York State to support settlement, trade, and development in western and upstate New York. A connection to Lake Ontario rather than Lake Erie would have been geographically simpler, but it could also have shifted more commerce and development toward eastern Canada rather than western New York. That historical competition between New York State and Canada interested me. I therefore began researching the St. Lawrence Seaway from Minnesota and the western Great Lakes (3) to the St. Lawrence Estuary (4). The book grew out of three earlier journal articles that were revised, expanded, and reorganized as three book chapters.

Q: What makes this topic scientifically important?

A: River and lake landscapes reveal how human systems and natural systems develop together. I framed the book as a series of concise case studies on leveed agricultural lands, river navigation, upland reservoirs, Great Lakes shoreline erosion, flood risk, and management of the St. Lawrence River system. Taken together, these studies show that change is the only certainty in river and lake systems. Climate, hydrology, geomorphology, engineering, settlement, trade, and governance all influence the direction and pace of change. The connection between soil and water creates both vulnerability and opportunity. Different communities also hold different visions for how river and lake landscapes should function. Managing for resilience is therefore the most practical way to prepare for future risks and catastrophes that cannot be fully predicted.

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

A: The central regions are the Great Lakes basin and the St. Lawrence River basin, including the St. Lawrence Estuary. The case studies follow the system from the western Great Lakes through the connecting rivers, the St. Lawrence River, and the estuarine and coastal landscapes that link the inland freshwater system to the Atlantic Ocean.

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

A: One of the most difficult parts was traveling to Newfoundland and Labrador (NL) during deer season, hurricane season, and an early snowstorm. Because Newfoundland is an island between the Gulf of St. Lawrence and the Atlantic Ocean, travel requires either ferry service or air travel. At the time, a hurricane moving along the U.S. East Coast caused shipping cancellations for several days. I decided to fly from Nova Scotia to Newfoundland on a propeller aircraft. When I arrived, the airport was crowded with deer hunters and large bags. Travel to Gander and to L'Anse aux Meadows National Historic Site (Figure 3) was also challenging because the roads needed repair and offered few alternate routes.



Figure 3. Norse settlement site at L'Anse aux Meadows National Historic Site, near St. Anthony, Newfoundland and Labrador. Photo credit: Lois Wright Morton. Reprinted with copyright permission from the Managing Editor of the Open Journal of Soil Science.

Q: Did anything during the research surprise you?

A: Yes. I was struck by the way the Great Lakes function as a stepped but connected freshwater system. Lake Michigan and Lake Huron are at essentially the same level and are hydrologically connected through the Straits of Mackinac. The descent toward Lake Erie occurs through the St. Clair River, Lake St. Clair, and the Detroit River, rather than through navigation locks or dams (Figure 4). This physical connectivity helps explain why water-level changes, storms, shoreline erosion, sediment movement, and navigation issues cannot be understood lake by lake alone.

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

A: The most underestimated processes include the effects of large-scale settlement in the St. Lawrence River basin, navigation and channel modification, the disposal of treated and untreated wastewater, water pollution, high-water levels in the Great Lakes and connecting rivers, shoreline erosion, invasive species, and flooding. Shoreline erosion is especially underestimated because its long-term effects can appear gradually until infrastructure, homes, beaches, and public access are suddenly at risk (Figure 5).

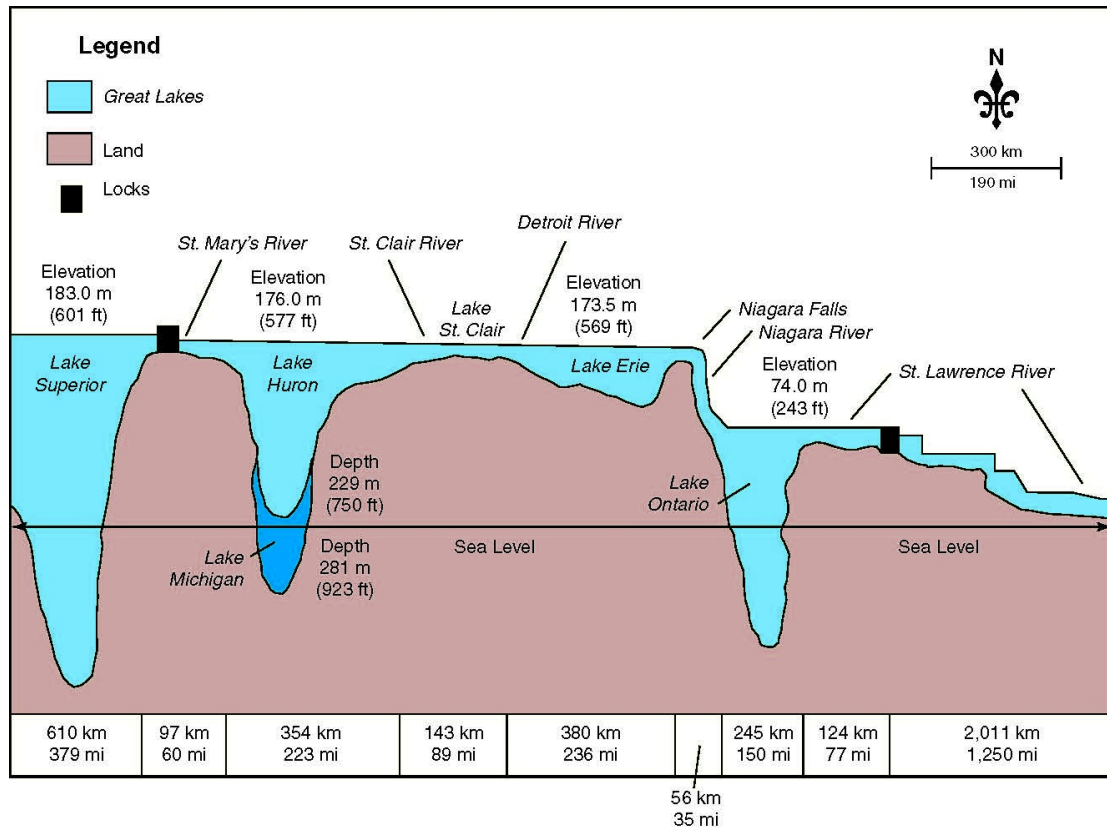


Figure 4. Great Lakes depths, surface elevations, and connecting waterways. Map created by Mic Greenberg. Reprinted with copyright permission from the Managing Editor of the Open Journal of Soil Science.



Figure 5. Shoreline erosion undercutting the shore and damaging a beach house on Lake Michigan. Photo credit: 2020 MLive Media Group. Reprinted with copyright permission from the Managing Editor of the Open Journal of Soil Science.

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

A: The St. Lawrence Seaway is a binational engineering and navigation system shaped by cooperation between Canada and the United States. Its environmental history is also connected to industrial and military logistics. One example is the Menominee River, which flows into Green Bay and Lake Michigan. The Ansul Chemical Company in Marinette, Wisconsin, manufactured Agent Blue, an arsenic-containing herbicide used during the Vietnam War in the 1960s and 1970s. Olson and Miller reported that almost all of the Agent Blue (arsenic based herbicide (5) used to destroy the South Vietnamese rice crop as part of President Diem's hamlet strategy and food denial program) used during the Vietnam War from 1962 to 1971 was manufactured at Ansul Chemical plants on the Menominee River between Michigan and Wisconsin (3). Surface water, groundwater, and river-bottom sediments near the Ansul manufacturing plant became heavily contaminated with arsenic released during the manufacture of Agent Blue. Ships carrying arsenic rich ash from a new copper smelting plant in Sweden carried the arsenic rich ash to the Ansul Chemical plant. The manufactured Agent Blue herbicide was stored on site and later shipped through Green Bay, the Great Lakes, the St. Lawrence Seaway, and the Atlantic Ocean, and then onward through the Panama Canal, the Pacific Ocean toward Southeast Asia and the coast of South Vietnam. This case illustrates how freshwater transport systems, industrial production, military supply chains, and long-term contamination can become part of the same environmental history.

Q: What should readers understand after reading this work?

A: Readers should understand that the St. Lawrence Seaway connects Lake Superior, Lake Huron, Lake Michigan, Lake Erie, and Lake Ontario with the Atlantic Ocean. The Great Lakes and their connecting waterways - including the St. Mary's, St. Clair, Detroit, Niagara, and St. Lawrence rivers - have long formed a major corridor for transportation, migration, trade, settlement, and environmental change. The Seaway remains critically important to both Canada and the United States because it provides ocean-going vessels access from the Atlantic Ocean to the inland Great Lakes system.

Q: Who is this book intended for?

A: The book is intended for public and private landowners, land managers, planners, and decision-makers working in St. Lawrence Seaway landscapes. It should also be useful to soil scientists, sociologists, conservationists, wetland specialists, human and physical geographers, urban planners, public health specialists, economists, geomorphologists, geologists, hydrologists, agronomists, foresters, and general readers interested in rivers, lakes, and environmental management. Each group encounters a different part of the same river-landscape problem.

Q: Which chapter is personally most important to you?

A: Chapter 3 is personally important to me. My father was Norwegian American, and he was excited to learn about the Norse presence in North America. The son of Erik the Red, Leif Erikson, is associated in the sagas with early Norse voyages to North

America. Archaeological evidence at L'Anse aux Meadows demonstrates that Norse people reached Newfoundland around the eleventh century, centuries before Columbus. Indigenous peoples were already present in North America, so the point is not that Europeans were the first people in the Americas. Rather, the site shows that Norse voyagers were the first Europeans known to have established a settlement in North America. The museum at L'Anse aux Meadows National Historic Site presents evidence and interpretation that support this history. More Americans should visit the site to learn about the earliest confirmed European presence in North America.

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

A: The St. Lawrence Seaway studies provide an analytical foundation for understanding how large freshwater systems mediate pollution, disease dynamics, trade, water governance, soil degradation, and public health risk. Their value lies not only in empirical detail but also in showing the structural and historical roots of contemporary environmental health problems. As global freshwater stress intensifies, this work offers insights for rethinking river governance, environmental responsibility, infrastructure maintenance, and public health resilience.

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

A: Many of the problems are worsening or becoming more difficult to manage. Locks and dams require maintenance and, in some cases, replacement. Shoreline erosion, invasive species, high-water events, pollution legacies, and climate variability continue to create pressure on the system. Even when management improves, the scale and complexity of the Great Lakes-St. Lawrence system make long-term adaptation difficult.

Q: Which future research directions emerge from this work?

A: This work encouraged me to expand my research on the St. Lawrence River and its tributaries to other great river landscapes in North America and around the world. The Yukon River in western Canada and Alaska and the Columbia River in western Canada and Washington, are of special interest because they also connect soils, freshwater resources, navigation, settlement, Indigenous histories, infrastructure, and environmental change.

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 Great Lakes-St. Lawrence River system at risk. Greater variability in precipitation, ice cover, storm intensity, and water levels can increase flood frequency in some periods and drought risk in others. These changes can accelerate shoreline erosion, alter sediment movement, remobilize contaminants, damage soils, reduce agricultural productivity, and place additional stress on levees, floodways, dams, and navigation infrastructure. Future

research needs to integrate climate projections with soil science, hydrology, water quality, infrastructure planning, and public health.

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 policymakers give it more attention?

A: Long-term soil damage is often less visible because it develops below the surface and over multiple growing seasons. Flooding can remove topsoil, deposit contaminated sediment, reduce soil structure, alter nutrient balances, compact fields, and impair drainage. These effects can reduce crop production and, in heavily affected areas, create long-term food security risks. Scientists and policymakers should therefore treat soil recovery as part of flood recovery rather than as a secondary issue.

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

A: I would recommend placing resilience at the center of river and floodplain management. Resilience means preparing landscapes, infrastructure, institutions, and communities for risks that cannot be fully predicted. It requires long-term planning, maintenance of existing infrastructure, protection of wetlands and floodplains, reduction of pollution sources, improved monitoring, and the ability to adapt management strategies as river and lake systems change.

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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