

BOOK REVIEWS

Lake Erie Rehabilitated: Controlling Cultural Eutrophication, 1960s – 1990s. William McGucken. 2000. The University of Akron Press, Akron, OH. 318 p. \$49.95 hardcover, \$29.95 paper.

This book is an historical account of the efforts within the last four decades to control cultural eutrophication in Lake Erie and the lower Great Lakes. Cultural eutrophication, as defined in the introduction to the book, is the excessive increase of a lake's nutrients by some human activity. During the reported time period, Lake Erie was diagnosed by scientific, governmental, and grassroots organizations as suffering from an aberrant growth in algae and other aquatic vegetation, as well as a reduction in the populations of certain fish species and the disappearance of other species altogether. The reason for these changes and the resulting reduction in Lake Erie's environmental quality was concluded to be excessive amounts of phosphorus—a plant nutrient—entering the lake. The sources of the phosphorus were determined to be effluent from municipal sewage and storm water treatment plants, agricultural runoff, industrial wastewater discharges, and commercial detergents containing phosphates. This is the “cultural” eutrophication around which the book is centered.

With the evolution of the domestic washing machine, both its use and the use of phosphate-containing detergents grew to incredible proportions. Municipal wastewater treatment plants were not treating water for phosphates prior to discharge, so the amount of phosphates entering Lake Erie from simple household laundering were excessive. Phosphorus was determined to be the main cause of eutrophication in the lake. Its sources were easy to pinpoint, and it was considered by those involved to be the most controllable cause of eutrophication. Thus, the challenge of halting cultural eutrophication in Lake Erie was declared: to control phosphorus inputs to Lake Erie via reduction of phosphates in detergents and reduction of phosphorus in municipal, industrial, and agricultural effluents in both the US and Canada.

This book is more than just the story of Lake Erie's near demise and resurrection. It is also the story of multi-disciplinary problem-solving, international cooperation, and the acknowledgment by scientists, engineers, governments, industry, and the public that the environment has limits that the human race must recognize. William McGucken does not take sides on this point, but rather presents an unbiased, historical account of the evolution of this unanimous realization, and the actions it prompted. Due to this approach, McGucken's book would make an excellent supplement for courses in history, geography, environmental science, and political science.

The book's introduction sets up and summarizes the rest of the chapters. It states clearly the central question of the book: “Did Lake Erie succumb to the major pollution problem that assailed it and other lakes around the

world in 1969, a problem that scientists refer to as ‘cultural eutrophication?’” (p 2). McGucken offers a review of other books on the topic of cultural eutrophication that have a direct relationship to the Lake Erie story, and he also gives a chapter-by-chapter review of the rest of his own book. This proves to be a very useful reference when reading the subsequent chapters.

McGucken breaks down the long, complex story of Lake Erie's struggle with cultural eutrophication into 15 relatively short chapters. The first three are an introduction to the problem of cultural eutrophication. They explain the nature of soap vs. detergents, and the science behind phosphates as a key ingredient in detergents and as a key nutrient in aquatic plant growth. All of this is explained simply, such that a background in science is not required for adequate understanding. These chapters also detail other geographical locations that experienced cultural eutrophication, international symposiums held to discuss the problem, a history of human activity on Lake Erie and the Great Lakes which lead to the cultural eutrophication problem of the last four decades, and a history of organizations involved in the study and rehabilitation of Lake Erie.

Chapters 4, 5, and 6 illustrate governmental involvement in Lake Erie's restoration. Chapter 4 details the meetings, committees, and reports generated by US municipal, state, and federal agencies that discussed removal of phosphorus from municipal and industrial wastewaters. Wastewater treatment technologies and limitations of the time period are also described. Chapter 5 deals with meetings that ensued between the US government and the detergent industry in an effort to find a substitute for phosphates in laundry detergent. Chapter 6 explains the coordination of US and Canadian efforts under the International Joint Commission to attack the eutrophication problem.

Because phosphates in detergents were such a large part of the eutrophication issue, Chapters 7 through 10 are dedicated to the individual efforts of both the US and Canada to regulate phosphate content in detergents. Efforts to remove phosphates from municipal wastewaters are also discussed. Chapters 11 through 15 unfold the conclusion of the Lake Erie cultural eutrophication story. Chapters 11 and 12 describe the creation of the Great Lakes Water Quality Agreement of 1972 and 1978, respectively, by the US and Canada. This was a unique environmental agreement with the express purpose of attacking the eutrophication of the Great Lakes. It addressed point and nonpoint sources of phosphates as well as phosphate content of detergents in both countries through an international cooperative effort on behalf of both governments. Chapter 13 discusses in more detail the efforts made to reduce phosphorus loadings to Lake Erie from nonpoint agricultural sources, resulting in the creation of a conservation tillage program in Indiana, Michigan, and Ohio. Chapters 14 and 15 complete the story, recounting the final stages in this effort to control cultural eutrophication in Lake Erie and the Great Lakes as a whole. The forty-year endeavor is described as a success story, with which I agree. McGucken correctly states that Lake Erie has not been returned to some former

condition. It is widely held by many scientists that Lake Erie has been rehabilitated to its "new" normal state. McGucken also notes that the practices involved in bringing Lake Erie to this new state will have to continue in order to avoid future cultural eutrophication.

This book is commendably thorough, giving details of meetings, symposium findings, committee formulations, personal quotations, and the like in an historical narrative. It appears that this level of detail is given to preserve historical accuracy and chronology. However, it also makes the book redundant. The finding that phosphorus in detergents and municipal wastewaters was the likely cause of eutrophication, for example, is repeated numerous times throughout the book. This repetition is the result of the author accurately recounting the findings of the plethora of meetings and committees, but readers would have been better served by stating that latter committees and meetings had arrived at the same conclusion rather than repeating the conclusion itself. The level of detail in the book also creates an occasional obstacle to continuity; there are times when the point of a paragraph or most of a chapter is obscured by the enumeration of the various events contained therein. However, McGucken begins each chapter with a paragraph that links it to the previous one and summarizes what the reader is about to learn, and ends each chapter with a paragraph summarizing what happened. These paragraphs are excellent and necessary to maintain the continuity of the book as a whole. A division of the table of contents into sections of introductory information (Chapters 1 through 3), governmental involvement (Chapters 4 through 6), the detergent issue (Chapters 7 through 10), and resolution

of the problem (Chapters 11 through 15) would have given readers a more organized picture of this complex story. And although definitions of eutrophication, detergents, and the role of phosphorus in both are presented simply, so that no reader is left out of the discussion, the process of sewage and wastewater treatment is not explained in the same manner. A short discussion of this along with a simple schematic diagram or process flow chart would have ensured the inclusion of all readers, regardless of their backgrounds.

Lake Erie Rehabilitated is an excellent historical account of the inter-agency and international collaborative efforts put forth to stop the cultural eutrophication of Lake Erie and the lower Great Lakes. It is written such that it would be a beneficial resource to historians, geographers, environmental and political scientists, and grassroots activists. It recounts the multi-disciplinary, multi-jurisdictional cooperative activities that took place to reverse environmental degradation, and thus shows that it is, indeed, possible for the human race to tackle the large environmental problems that still exist today. The rehabilitation of Lake Erie is a shining example of what humans can do to restore and preserve their environment, and serves as a wake-up call to those who believe that we are not responsible for our actions, or that we cannot correct past mistakes. McGucken showcases these points through research and unbiased writing, presenting the Lake Erie story as a case-study for the future.

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