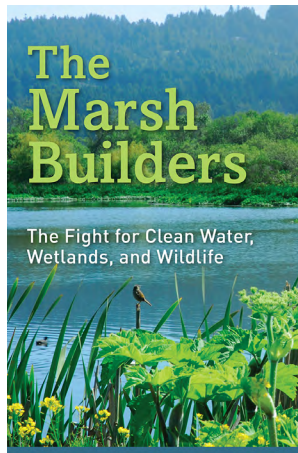


The Marsh Builders: The Fight for Clean Water, Wetlands, and Wildlife

By Sharon Levy. 2018. Oxford University Press. 248 pages, 39.95 CAD, Cloth. Also available as an E-book.

The Marsh Builders, a book about constructed wetlands? Well not exactly, but that appears to be what inspired Sharon Levy to embark on this historical account of human waste, wetland destruction, and the United States' *Clean Water Act* (CWA). The actual "marsh building" doesn't start until around halfway through the book!



Humanity's relationship with the environment has changed dramatically over the past 200 years. We all know this, but to write a book that documents our history from the perspective of human waste, wetlands, and water pollution is unique. Levy has obviously done extensive research; in fact, there is an extensive list of numbered references at the end of each chapter. As a result, the book provides an insightful and vivid account of the science and politics of dealing with a very real problem—what to do with human waste as cities like London and Berlin develop with populations of over a million people and growing. Piping waste to the nearest watercourse is fine, until your neighbours downstream become ill. The book draws the reader in with the first chapter, "Cholera's Frontiers", set in London, England, around 1850.

Chapters 2 and 3, "The Tides of Change" and "The Microbe Solution", document our evolving understanding of disease and its link to human waste. Initially dis-

ease was thought to arise from miasma, or the stench of human waste, but new tools, such as the microscope, and scientific approaches to treating human waste, such as the activated sludge process discovered in 1914, began to inform the politics of urban planning. Elected officials, then as now, were responsible for public well-being and, working with limited funds and the best knowledge of the day, approved infrastructure projects to deal with human waste. The CWA created in 1971 transferred authority over sewage and industrial effluent regulation from individual states to the federal Environmental Protection Agency (EPA), mandating "a wildly idealistic goal that all such discharges into US waters should cease by 1985" (p. 75). To this day, individuals living in cities simply flush the toilet and turn on the tap for clean water, with little thought of the long and continuing struggle to make this system work. Herein lies the heart of *The Marsh Builders*, the tension between science, politics, and human waste.

Chapter 6 describes "Fighting the Big Machine"—aka the Humboldt Bay Wastewater Authority (HBWA)—versus the small-town politics, petitions, committees, and legal battles that delayed conventional approaches to wastewater treatment long enough for a treatment alternative to emerge that would be replicated around the world. Levy gives a detailed account of the small, feisty town of Arcata, located on the Pacific coast of northern California, and its fight with the HBWA. It's a classic story of David fighting Goliath: big government with federal funding intended to build a sewage treatment megaproject connecting small towns with a pipe running under Arcata Bay to a regional treatment plant on Humboldt Bay. Each town along the route was expected to join the project, including making enormous, sometimes bankrupting, financial contributions to building and maintaining the infrastructure.

Arcata had a different vision for wastewater treatment: a low cost, low energy, local solution using open surface water wetlands that would meet CWA guidelines, create wildlife habitat, and improve the ecology of Humboldt Bay. However, this had never been done before and few believed it would work. It was a fight against the bureaucratic and engineering status quo, and Arcata won in the end. But with the wetlands now almost 40 years old and losing their capacity to treat the ever-increasing volume of sewage, Arcata once again finds itself up against an “engineered” solution versus the original treatment wetlands now rich in native biodiversity.

As an ecologist, it is painful to read Chapter 7, “The United States of Vanished Wetlands”, that documents the once great bounty and biodiversity of coastal and inland wetlands in America that were demonized for health reasons, hated because they could not be traversed, and deemed unproductive until drained. *The Marsh Builders* details what early colonizers faced in America and describes how society’s perception of wetlands, disease, and pollution have changed over time. The once Great Black Swamp, a wetland over 4000 km² in size, was a major impediment for people moving westward and seen as a breeding zone for mosquitos until it was drained and converted to farmland. Today, flooding and non-point sources of agricultural pollution causing toxic algal blooms in rivers and lakes have society revisiting their relationship with the Black Swamp, with calls to return 10% of the landscape to wetland.

The Marsh Builders also documents the introduction and rise of new exotic diseases associated with wetlands, such as malaria and yellow fever, which were brought to America with colonization. When science identified mosquitos as the insect vector for these diseases, government in its bid to protect citizens institutionalized the draining of wetlands and in the 1940s promoted the use of organochlorine pesticides such as DDT. Few drained wetlands are restored today, but fortunately where habitat is available wildlife is recovering following a ban on the use of DDT in 1972.

The last chapter of the book, “The Fight This Time”, highlights the fact that, while it is well known that non-point sources of pollution (mainly from agriculture) cause over 75% of rivers and lakes to fail water quality standards, the CWA exempts farmers from their standards. And the momentum building in the EPA to regulate non-point sources of pollution has been derailed by Scott Pruitt, appointed by President Trump to head the EPA. While writing this review, I learned that Pruitt resigned as head of the EPA in December 2018. He will be replaced by Andrew Wheeler, a former coal lobbyist, dramatically highlighting the continuing saga of the tension between science, politics, and the world we choose to live in. *The Marsh Builders* is probably not the best title for the book, but that shouldn’t stop you from reading this excellent account of our relationship with water and wetlands over the past 200 years by veteran science journalist Sharon Levy.

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