

title **WATER – A NATURAL HISTORY**

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an environmental engineer living in Vermont

category Ecology / History - water issues with settlement
and development of USA

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of note Chosen as one of the “Best Science and
Technology Books of 1996” by Library Journal
<http://www.libraryjournal.com/>
Nominated for the Winship/PEN New England
Award
http://www.pen-ne.org/awards/winship_award.html



who should be interested in this book?

Readers interested in how human settlement and development affect the natural cycle. This book covers the settlement of the USA from the 1600's and the affect it had on the water cycle and how that explains some of the current water issues.

why read this book?

The human impacts that occurred in the USA to beavers, forests, grasslands, prairie dogs, and aquatic life as presented here are not dissimilar to those which occurred in parts of BC and Canada (e.g., the value of reintroducing beavers is the theme of the BC Chilcotin ranching book, *Three Against the Wilderness*, reviewed elsewhere in this section).

review / outline by Lance Brown, vistadelsol@telus.net

Overview

Not to diminish the value of this book, but the title suggests a wider subject than is actually covered – “A Natural History *in the USA*” would be a better fit.

Outwater presents the argument that prior to start of settlement (1600), the North American water cycle included vast wetlands formed by beavers, stable grasslands sustained with bison grazing and native burnings, extensive forests, and free flowing rivers. Disturbance by man was slight with small populations spread widely over the land. With the arrival of Europeans, all that started to change, slowly at first. Eastern forests were logged, beaver were trapped for their fur value, and land was cultivated.

Eventually as settlers moved west, these impacts increased, with bison hunted out and prairie plowed. By the 1900's, federally-funded extensive water developments to encourage settlement were started that by the late 1900's had left very few free-running rivers in the USA. All of this was done for well-meaning reasons, but with the ecological effects quite evident now.

Outwater ends on a positive note making the case for restoration of land and riparian areas to bring back lost ecosystems and healthy waterways.

However there remains some conflict between land and resource users and pristine environments. How successfully these conflicts are resolved will determine the success of Outwater's vision.

Detailed chapter notes and an extensive bibliography for further reading are provided.

Eleven Chapters with Points of Interest

PART 1 Dismantling The Natural System

Here, Outwater weaves an interesting and very readable story of changes to the natural US ecosystem by the combination of near elimination of beaver; extensive logging; grasslands changed by loss of bison, prairie dogs (specifically the effect of their tunnels) and cultivation.

1. *The Fur Trade*

This chapter looks at how beaver were trapped out of most of the US by early trade.

- early 1600's beaver pelts shipped to England and Europe until beaver exhausted
- 1664 shipments to England of 35-40,000 dropped to 9,000 in 1684
- by 1700 when trade stopped, 2 million had been shipped to England and beaver were exterminated in US east coast – Canadian trade was sustainable lasting 200 years
- fur business moved west and by 1840's with the first wagon trains, beaver were all but eliminated in the west as well
- the beaver-created and maintained wetland ecosystems were gone, greatly affecting water flows

2. *Natures Hydrologists*

This chapter considers the benefits of a beaver population to ecosystems and water.

- decline in beaver population was first major shift in the countries water cycle
- beavers do more to shape their environment than any other mammal except humans
- once lived from Artic to northern Mexico, except for swamps of Florida and Louisiana
- estimated 200 million lived in US
- affected entire water cycle in watersheds, creating wetlands that support ecosystem of creatures and help clean water
- beavers disappeared by trapping "hat by hat" and their dams collapsed
- wetlands were then lost, so water no longer seeped into the ground and to aquifers
- freshet flows increased, water tables dropped, water quality reduced

3. *The Woods*

This chapter looks at the forest change due to settlement.

- early settlers had an Eurocentric view of forest as alien, unhealthy as sunlight didn't reach the ground, and forest-dwelling Indians were threatening
- eastern US largely logged by 1840's
- 1848 California gold rush created demand for western wood
- 1872 – Yellowstone 1st national Park; 1891 – federal forest reserves allowed
- value of forests being realized

4. *The Voyage of Rainfall*

This chapter describes the various paths water takes via trees, soil, deforested land, etc.

- half of precipitation goes back into the air by evaporation and transpiration
- positive affect of forests on flow to stream and stream hydrology; snow and snow melt characteristics
- water and nutrient use and movement in trees

5. *A Sea of Grass*

This chapter describes effect on water cycle with changes to grasslands.

- formation of US grasslands
- grasslands (prairie) a complex system, including Indian-managed fire, bison grazing, prairie dog
- bison wallows and prairie dog tunnels affect water movement
- with settlers, bison were killed off, grass wasn't burnt, prairie dogs were poisoned

6. *Plowing the Plains*

This chapter looks at the effect of the federal governments desire to populate the west.

- 1862 Homestead Act started settlers plowing the prairie
- Dust Bowl problems of the 1930
- irrigated needed in much of the west; failure of private water supplier companies lead to 1902 Reclamation Act allowing federal money be used for water storage and supply

PART 2 Engineering The Waterways

Here, Outwater outlines government agencies water developments and population impacts to waterways.

7. *The Water Over the Dams*

This chapter looks at dam construction in the 1900's and effect on salmon.

- from 1905 to 1991, \$18 billion spent on dam construction in US
- effect on silt and organic matter in rivers; loss of salmon runs due to dams

8. *Mussels, Gators, and the Corps*

This chapter looks at the harvesting of mussels, loss of wetlands, the Army Corp of Engineers.

- pearl button business - pearling eliminated many freshwater mussels in 1800's
- clearing of Mississippi riparian areas for wood-fired steam boats
- wetlands lost due to canalizations
- 1824, Army Corp of Engineers started improvement of inland water for boat traffic
- Mississippi canalized, dams and levees built
- today 26 dams on Mississippi; 60 on Missouri

9. *Aqueducts and Toilet Bowls*

This chapter looks at the history of domestic fresh water supply and septic systems.

- 1793 - yellow fever in Philadelphia; cholera in New York in 1832
- domestic pumped water and septic systems by mid 1800's – water use skyrocketed
- 1884 – E.coli and microorganisms responsible for water borne diseases discovered
- 1872 – first treated water; 1903 – Hazen Theorem gives correlation between water supply and mortality rate
- 1908 – first chlorination in US via Chicago stockyards (!)

10. *Down the Drain, Up the Stack*

This chapter looks at industrial discharges – “better living through chemistry”.

- 1940 – 1 billion pounds of synthetic organic chemicals; 160 billion by 1970
- until DDT, it was thought the environment diluted chemicals, not concentrated them
- 1953 radioactive fallout detected
- 1965 Water Quality Act; 1969 National Environmental Policy Act
- 1972 Clean Water Act and creation of Environmental Protection Agency

11. *What Sludge Tells You*

This chapter looks at the municipal sewage treatment and summarizes previous chapters.

- Boston sewage pumped into outgoing tide until 1992
- waterways are transformed by omissions due to human activities
- some Army Corp projects now being “reversed”
- people will change their ways when they understand how the system works – e.g., that toilets are connected to rivers

[other review](#) **Publishers Weekly**

A generation after the Clean Water Act was passed, one third of our waters are still polluted, according to the author, and only 6% of contamination is caused by industry. Environmental engineer Outwater, who managed scum and sludge removal in the Boston Harbor cleanup, reaches back into our history to chart the changes in our waters. Once, a tenth of the total land area was beaver-built wetland; the beaver's decline caused the first major shift in the nation's water cycle. The depressions buffalo made on the ground and the holes dug by prairie dogs collected rain and runoff that seeped down to the water table; our waterways have been transformed by the loss of these keystone species. Outwater looks at grasslands and forests, artificial waterways, agriculture, aqueducts and toilet bowls, sewers and sludge (she gives a guided tour of a waste-treatment plant). She makes a strong case for restoring natural systems to public lands? - repopulating beaver, bison and prairie dogs. This book is a valuable addition to environmental literature and to our understanding of water.

[other review](#) **Amazon.com**

What happens when you flush your toilet? Environmental engineer and writer Alice Outwater knows, and she guides the reader through the technical ins and outs of such delicate matters as water treatment and sewage handling--subjects she writes about with considerable charm. Here you will learn how "raw sludge brew" is separated, how methane from sewage is converted to a source of power, and how aqueducts past and present really work. Outwater also describes in lay terms the complex ecology of rivers, making a strong case for the preservation of free-flowing streams in the place of dammed waterways. Her book is somewhat more narrowly focused than the title suggests, but it is highly interesting and instructive nonetheless.

[other review](#) **Basic Books**

An environmental engineer turned ecology writer relates the history of our waterways and her own growing understanding of why our waterways continue to be polluted—and what needs to be done to save this essential natural resource. *Water: A Natural History* takes us back to the diaries of the first Western explorers; it moves from the reservoir to the modern toilet, from the grasslands of the Midwest to the Everglades of Florida, through the guts of a wastewater treatment plant and out to the waterways again. It shows how human-engineered dams, canals and farms replaces nature's beaver dams, prairie dog tunnels, and buffalo wallows. Step by step, Outwater makes clear what should have always been obvious: while engineering can de-pollute water, only ecologically interacting systems can create healthy waterways. Important reading for students of environmental studies, the heart of this history is a vision of our land and waterways as they once were, and a plan that can restore them to their former glory: a land of living streams, public lands with hundreds of millions of beaver-built wetlands, prairie dog towns that increase the amount of rainfall that percolates to the groundwater, and forests that feed their fallen trees to the sea.