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Rivers of Power: How a Natural Force Raised Kingdoms, Destroyed Civilizations, and Shapes Our World by Laurence C. Smith (Little, Brown Spark, 2020)

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BOOK REVIEW

Rivers of Power: How a Natural Force Raised Kingdoms, Destroyed Civilizations, and Shapes Our World by Laurence C. Smith (Little, Brown Spark, 2020)

What do bouncing bombs, Nilometers, Archimedes screws and hydraulic batteries all have in common? They have all been used on rivers and are all encountered in Laurence Smith's *Rivers of Power*.

Readers familiar with activist-focused works having punchy titles like *Water Wars* and *Cadillac Desert* might expect a similar work here. Those books had the issues laid out in loosely connected case studies that were then cinched together with an exhortation to action in the epilogue. This book is not that. Instead, Smith meanders through a vast array of topics that would be totally disparate but for a sometimes-tangential connection to rivers. In lacing together his work, however, Smith manages to include topics of interest—sometimes taking a controversial stand, as discussed below—to engineers, historians, environmentalists, attorneys, scientists, and policy makers.

Smith quickly hooks the reader with a totally unexpected cold splash of reality. Rivers began forming on Earth about 4 billion years ago, and in about another 2.8 billion years our dying sun will boil away all liquid water, and life as we know it will end. But to the do-gooder who suddenly feels their efforts to save the Earth may be futile, he offers fascinating tidbits: Titan, a moon of Saturn has river and delta patterns similar to ours, but the rivers are liquid methane, and the riverbeds are likely ice. I had no idea.

Students of history will appreciate the treatment of several ancient civilizations that formed along major rivers and their connection to fundamental economic theories: what made these civilizations thrive and become powerful was the fact that waters of the rivers were used to grow an abundance of crops that, because basic needs were met with surplus, allowed complex and specialized economies to develop. In short, economic specialization comes after breakfast.

The engineer will appreciate Smith's inclusion of a variety of hydrologic and hydraulic tools like Cairo's Nilometer that was used to measure the Nile's annual flood progression—who knew that Egypt's rulers could estimate its crops and levy taxes months ahead of time simply from the height of the flood? High floods meant more arable land, bigger crops, and thus more tax revenues. As Smith guides the reader to the present day, he also touches on many other engineering innovations that run the gamut of complexity and cost: from the inexpensive ponds built in the middle of rice paddies used to catch fish when monsoon floods recede, to the multi-billion-dollar Los Angeles groundwater recharge program using recycled wastewater.

The lay person and historian alike should be able to use Smith's work as a starting point for more focused reading on topics like ancient riparian civilizations, environmental degradation of rivers to the point of their becoming "pork soup" in China, and World War II history including Britain's use of bouncing bombs to destroy German dams and other infrastructure. I was especially enthralled by the story of the Chinese purposely breaching a levee on the Yellow River to snarl invading Japanese troops in 1938. According to Smith, the breach did little to slow

the Japanese, and instead killed nearly a million Chinese, which may have played an underrecognized role in the eventual Communist revolution and expulsion of the Nationalist government to Taiwan.

The attorney will be drawn to Smith's explanation of the unexpected connection between dam failures and the development of strict liability tort law in the US and Britain. In 1889, a private dam failed in Pennsylvania, resulting in the deaths of over 2,000 people in Johnstown and surrounding areas, and \$17 million in property damages. The reservoir was owned by a club of millionaires and used for recreation. Despite the damage, loss of life and evidence of poor dam maintenance, club owners paid nothing. At the same time, British courts had had enough of private dam failures and began holding owners strictly liable. After the Johnstown disaster, US courts followed suit.

Lawyers and policymakers will also find useful the author's treatment of large-scale, multi-national river management treaties and strategies on the Rio Grande, Nile, and Mekong. To some extent, the US' Harmon Doctrine, named after the Attorney General who argued in 1895 that the US had full right to use all of the Rio Grande's water because it was the upstream sovereign, is being repeated today on the Nile and the Mekong. In contrast to such winner-take-all adversarial approaches, Smith recounts that over 500 transboundary river sharing agreements are now in force around the world, and the number continues to grow.

Smith arguably errs on two points. First, while his recitation of past, present, and future engineering feats makes for good reading, his engineer-worship understates the damage large-scale engineering works have wrought on the landscape. He also ignores the evidence that over-reliance on increasingly complex, hard engineering structures lack both engineering and ecological resilience, where resilience is defined as the ability for a system to repair itself after a shock. In other words, levees can be made stronger, but when they fail they cannot heal themselves, and large-scale loss of life and infrastructure follows. In contrast, barrier islands and coastal mangrove forests that attenuate flood surges at no cost to the taxpayer also heal themselves after storm damage. To be fair, the author does an excellent job describing the impacts that dams have had on up- and downstream ecosystems and displaced human populations. However, his glowing review of the new and expanding multi-billion-dollar levee and pump systems around New Orleans—"any new technology that reduces flooding represents a direct and immediate benefit to society"—reveals his bias for complex solutions. If it is more complex, it must be better. Right? Unfortunately, as engineered systems become more complex, they become more apt to failure in new and unpredicted ways . . . not to mention more expensive. This cognitive bias causes us to ignore the simpler, less-costly, and more resilient solution of moving people and infrastructure out of flood-prone areas and allowing the Mississippi River to do what it does from time to time—flood massively. Policies that reward people for voluntarily leaving risky areas rather than rebuilding reduce the perceived need to continue building these multi-billion-dollar boondoggles at taxpayer expense.

Second, Smith ignores that the reality of global population growth makes providing meat to everyone an impossibility. Smith argues that "in a world that will hold nearly 10 billion people by 2050, this global trend (toward commercial aquaculture) seems both inevitable and desirable." "Done right, farmed fish,

crustaceans, mollusks, and perhaps even algae one day can and should comprise a growing share of the food we eat.” What Smith fails to consider is that all these animals must eat and, inevitably, that means more land-based, industrial agriculture—even to support aquaculture. Conversion of native ecosystems to monocultures to feed animals reduces habitat for wildlife and negatively impacts ecosystem services. Instead, we humans need to be pushing more toward a plant-based diet, which has the triple benefit of reducing natural habitat loss, limiting the growth of greenhouse gases, and being healthier for humans. Again, to be fair, Smith’s contention treats aquaculture, not land-based agriculture, and some evidence indicates that aquaculture is better for the environment than land-based agriculture.

While Smith’s book lacks a clarion call, that was clearly not his intent. Rather, the author has collected a highly readable, near-encyclopedic number of stories, large and small, that illustrate humans’ multi-faceted and timeless connection to rivers, which can motivate the reader to further research on a wide variety of topics. It deserves a spot on the bookshelf of any professional working in the water resources arena.

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