Stu's Notes #10

Stu's Notes provide selected passages from books that are of interest to Stu. They are primarily direct quotes, though some longer passages are summarized. They do not generally provide a thorough synopsis of the book. Rather, they capture individual facts or opinions of interest, which may or may not be reflective of the overall text.

Title: **Something New Under the Sun: An Environmental History of the Twentieth-Century World**

Author: J. R. McNeill

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Summary: *Broad and thorough analysis of environmental changes in the twentieth century: lithosphere, pedosphere, atmosphere, hydrosphere, and biosphere. Highlights the largely-ignorant role that humans have played in creating these changes.*

Highlights:

Transferring nutrients from the soil to the ocean [p.22-23]

The water system [p.119-148]

"When the well's dry we know the worth of water." [p.149]

Salinization of irrigated lands [p.181]

Timeline of human history [p.192-193]

Deaths from disease and warfare: "Infections killed far more soldiers than did combat until the twentieth century. … only after 1905 could doctors keep mass armies healthy enough that they could butcher one another en masse." [p.197-198]

The sixth great extinction event in earth's history [p.263]

"… in the twentieth century, two trends – conversion to a fossil fuel-based energy system and very rapid population growth – spread nearly around the world, while a third – ideological and political commitment to economic growth and military power – which was already widespread, consolidated." [p.268]

Chapter 2: The Lithosphere and Pedosphere: The Crust of the Earth

"Without much understanding it and usually without intending to, people have long altered soil chemistry. Since the dawn of agriculture, human farming has reduced the nutrient supply in many of the earth's soils. This happened on a very modest scale before cities, because most of what plants extracted from the soil soon returned to it after shorter or longer stays in animal and human alimentary canals and tissues. But with cities, human societies systematically exported nutrients from farming and grazing land. Some were returned, especially where human excrement ('night soil') was collected and distributed to farmers as fertilizer, a practice mentioned by Homer in *The Odyssey* but done most consistently in China and Japan. But much was not, and instead flowed into sewers, rivers, and the sea. In the 20th century, with its pell-mell urbanization and its vast expansion of farming and grazing, the scale of nutrient export became many times greater than ever before." [p.22-23]

Chapter 3: The Atmosphere: Urban History

"For most of earth's history, microbes played the leading role of all life in shaping the atmosphere. In the twentieth century, humankind stumbled blindly into this role." [p.51]

Chapter 5: The Hydrosphere: The History of Water Use and Water Pollution

"Of the hydrosphere's 1.4 billion cubic kilometres, more than 97 percent is salt water in the oceans. Happily for us, the solar desalination and purification machine pumps up about half a million cubic kilometres every year, which falls back to earth as rain and snow. This is the source of all the world's stock of fresh water. Most of that (69%) is currently locked up in ice caps and glaciers, almost all of it in Antarctica. Almost all the remainder (98%) lies underground in aquifers, mostly at inaccessible depths. Only about one-quarter of 1 percent of the world's fresh water (approximately 90,000 km^3) is in lakes and rivers, where it is most easily accessible. Of this, about a quarter is in Lake Baikal in Siberia. Small amounts of fresh water are in the atmosphere, in permafrost, and in living things." [p.119]

"In 1860 Chicagoans thought Lake Michigan was so large it could easily absorb the wastes their city might dump into it. Time proved them wrong. Similarly, most people living on the shores of the Black Sea or the Yellow Sea in 1900 gave no thought to problems that might arise from using the coastal seas as a sink for wastes. These seas appeared infinite for all intents and purposes. Time proved them wrong too. Today it is the deep oceans that are used as receptacles for all manner of wastes, on the theory that they are so huge they can safely dilute whatever human activity might inject into them. So far, that theory has held up." [p.137]

"From the point of view of the deep seas and the oceans, the twentieth century was much like any other. Human impact scarcely extended beyond the inland seas and the coastal zones. These, however, are important, as they house most of the saltwater

biota. {Footnote, Gorman 1993: 106-7; 90% of marine species reside in coastal waters on the continental shelves in what amount to well under 1% of the ocean's space.}" [p.137]

"The oceans were big enough – like space – that even the twentieth century's garbage and pollution mattered only around the edges." [p.147]

"The oceans are difficult to pollute seriously, because of their size, but should it be done, they will be nearly impossible to clean up." [p.148]

Chapter 6: The Hydrosphere: Depletions, Dams, and Diversions

"'When the well's dry we know the worth of water.' ~ Ben Franklin, *Poor Richard's Almanac*" [p.149]

"Irrigated fields accounted for 16 percent of the world's total cultivated area in 1990, and for some 30 percent of total food production." [p.181]

"In the 1990s, salinization seriously affected about 10 percent of the world's irrigated lands. By 1996, it ruined land as fast as engineers could irrigate new land, so that the world's total irrigation area remained roughly constant." [p.181]

Chapter 7: The Biosphere: Eat and Be Eaten

"That [global] biota evolved without reference to humankind for about 3.5 billion years. Humanity, at least in our primitive form, arrived 4 million years ago. For most of the last 4 million years, most of the biota continued to evolve without our influence, because we stayed in small sections of the biosphere, mostly in Africa. We were few in number and technologically little superior to other primates, merely one species among many. Then, perhaps half a million years ago, we domesticated fire, allowing us far greater influence over plants and animals. This helped us colonize much of Africa and Eurasia. About 30,000 to 40,000 years ago we developed new tools, perhaps better communication (the date of the origins of human language remains murky), and more formidable social organization. With this departure we became a rogue primate, genuinely dangerous to many other forms of life, and disproportionately influential in coevolution. Our capacity to alter biotas grew further with the domestication of plants and animals some 10,000 years ago. That permitted quicker expansion of our numbers, greater division of labor, and faster technological change – which in turn led to further domestication, in a positive feedback loop that accounts for the general direction and character of subsequent human history." [p.192-193]

"The program of late nineteenth century imperialism posed stiff challenges for environmental control of disease organisms. Armed with the tools and wealth created in the crowded, unhealthy industrial cities, western Europeans, and later Americans and Japanese, created colonial empires that spanned the globe by 1900. The process of building such empires required moving soldiers all over the world, and the outcome – more mines, plantations, and taxes – sent streams of refugees and laborers this way and that. Migrations and invasions often put people in microbial harm's way." [p.196]

"A striking feature of this shift in the history of pathogens, in temperate and tropical zones alike, is the large role played by military doctors. Big agglomerations of men crowded together in alien environments had always invited disease. Infections killed far more soldiers than did combat until the twentieth century. European armies after 1880 managed to lower the toll taken by tropical diseases especially, making imperialism in the tropics feasible. But the Japanese army proved the most systematic, protecting its forces with multiple vaccinations in the successful war against Russia in 1904-1905 – the first war in which battle deaths outnumbered disease deaths. Indeed the protracted mass slaughter of World War I required effective military medicine: only after 1905 could doctors keep mass armies healthy enough that they could butcher one another en masse." [p.197-198]

Chapter 8: The Biosphere: Forests, Fish and Invasions

While expert views are numerous, many observers expect 30 to 50 percent of terrestrial species to disappear in the next century or two. If it happens, it will be the sixth great extinction event in earth's history, far faster than any previous one, and unique in its cause. [p.263]

From the very long term perspective, humanity in its high-energy phase (roughly since 1820) may resemble cyanobacteria of 2 billion years ago. Those diminutive creatures, whose descendants are blue-green algae, pioneered new metabolic paths, as we have recently done, and refashioned the world in the process. They excreted oxygen while using hydrogen from water, thus raising the oxygen concentration in the air from 1 part per trillion to the current 1 in 5. This conveniently poisoned most other bacteria, to which oxygen was toxic, and made more room for more cyanobacteria and other oxygen-tolerant creatures. Humankind used more tools than simple oxygen poisoning, but took steps down the same path, toward a biosphere of our making. It is not one of our choosing, however, as we are scarcely more conscious of the process than were cyanobacteria. [p.265-266]

Chapter 9: More People, Bigger Cities

"My simplest answer is that in the twentieth century, two trends – conversion to a fossil fuel-based energy system and very rapid population growth – spread nearly around the world, while a third – ideological and political commitment to economic growth and military power – which was already widespread, consolidated." [p.268]