

Conservation of Resources Book Talk

by Liz Barker

Extracted by Ugo Bardi (2013)

This report to The Club of Rome on the history of mineral depletion renews my faith in the availability of interesting, informative science books for adults. The topic is not exactly uplifting but the book is such an intelligible, well organized view of mining that it is a pleasure to read. It begins with a compact geological history of the earth, explaining why changes occurred, and continues progressively through time. Each chapter presents an overview of different aspects of the industry and an essay on related extractive products.

Volcanoes and geysers were human's first experiences of what lay beneath the earth. A semblance of access to that mysterious world and its forces was provided by caves. This may be why there are paintings in those dark depths. Extracting products from the earth also date back to prehistoric times, beginning with stone. We still quarry large quantities of stone and sand and gravel. Minerals and fossil fuels are the main topic here. They are less accessible and there is some concern about their continuing supply. Meanwhile mining continues, as does exploration for new sources. Use is just as proliferate with little conserving or recycling. We tend to view today's conditions as unchanging and have generally ignored the possibility that our activities can influence the status quo.

All those geological processes have determined how fossil fuels were formed and where minerals were distributed within the crust. During early phases all life was in the ocean and accessed minerals there. Then plants moved onto land, learning how to get minerals by sending roots into the ground. Animals, including man, got minerals from plants. Then man found other uses for minerals. Now he digs them out of the ground in vast quantities. He disrupts the soil cycles, depleting fertility, which is a constant flow of nutrients between organic and inorganic forms

Deer antlers may have been the first diggers. Rocks could be broken by throwing cold water on heated stone. Gold was probably extracted first. Copper also exists in surface deposits and melts in open fire. Iron requires more heat (charcoal) and lower oxygen. It can then be reheated and beaten into shape but is brittle and doesn't hold an edge. Steel is the next stage, each requiring more energy and better ways to apply it.

Black powder for blasting was developed in China. Coal was used as a fuel by Romans and in China. It made iron cheap and brought forth the steam engine. Deeper resources could be extracted - powered by coal with iron muscles and funded by gold and silver. Sixteen new

minerals became useful. Oil provided a cheaper and more versatile energy source. Higher demand encouraged the development of better technologies, sometimes reducing the extraction costs.

Fracking and mountain top removal are examples. Profitable fracking has a short life span and needs to exploit large geographic areas. Over time these techniques have decreasing returns on investment. They leave behind an environmental and societal cost of barren ground, erosion, and water pollution, ground effect. The need for a different source of energy becomes more apparent. Nuclear possibilities are given short shrift, mostly because of a fuel supply problem. The sun is touted as the best fusion prospect.

But it is money that makes the world go round. Gilgamesh had to steal timber. Hunting and gathering societies were egalitarian because there was it wasn't practical to accumulate goods. The excess was shared within the group. Trading has limited utility because matching specific excesses is limited. Agriculture and mining produced more sedentary communities and enabled the accumulation of goods. This made raiding profitable and established trade and military conflict. Gold was the primary fuel. Cannon armed galleons defeated the caliphate which had no timber to make steel. Europe had plenty. Soldiers paid in land led to feudal system.

Military might evolved to commercial empires. Britain was the first energy based empire. Its 1920 coal energy production was equal to burning all world's forests. Oil plus the strategic importance of other metals for technology support are the power ingredients today. Funding remains important. The paper representative of gold today stores value only if properly invested and must retain higher value than tangibles. These needs have produced a war against the planet and we are the only casualties.

Energy remains the limiting factor of mineral extraction. We need to stop this dispersive use of metal and design repairable, reusable products. Modeling use and production can produce efficiencies. An interesting comment was that things done illegally are done most efficiently. I suppose poaching would be an example. Humans seem unable to avoid prioritizing short term gain over long term or the individual over community. The Middle Ages were actually a time of fertile development because it was freed from the costs of maintaining governmental bureaucracy and the military. Today we believe that we will be able to continually develop substitutes for scarce resources and that technological solutions will save us.

Complex systems have resilience built into them. For instance roads generally provide multiple alternative routes if one is compromised. One way economic systems began with agriculture. Think of our insistence upon the status quo, of wanting to get "back to normal". We keep applying inefficient halfway measures. Agriculture is dependent on phosphorus for symbiotic nitrogen production by mycorrhizal fungi. Only 2% of an application is used the first year and

the rest is runoff. There is a disconnect between a product's cost and its value. Solar energy has its own costs. Wind power needs magnets. LEDs use rare earths. There is mercury in fluorescents. Resources are converted to wastes by mixing them. We depend upon poor people in other countries to recycle goods which we should switch to being used rather than owned. We need to examine the values of regeneration vs. growth, availability vs. profit, value vs. price, energy vs. money.

Systems have leverage points; a small change produces big effects. . Nothing around us continually grows except cancer. Without using spaceships we have found a way to travel to another planet. The Kubler Rose grief stages: denial, anger, bargaining, depression, acceptance, could apply to the coming economic collapse, resource depletion, and ecosystem disruption.

Age of Consequences by Courtney White (2015)

Courtney White lives in New Mexico and founded Quivira Coalition, a collaboration between environmentalists and ranchers, after a long association with the Sierra Club. His book is a more philosophical sojourn through his life and across the country as he explores holistic ways to enable humankind to live sustainably within the natural environment.

Through the years many of the problems resulting from man's increasing population and influence on the environment have resulted in conflicts between seemingly irreconcilable opposites. Governments, general economic concerns, businesses, and private interests are all involved in our relationship with the natural world - and frequently at odds. Science has helped us better understand how our environment functions and how we influence it -information often used by all sides.

White feels that any resolution to the problems faced today can be resolved only if all those disparate interests can work together. He calls this solution the Radical Center. What we do best is to dominate. Rigid orthodoxy keeps us from finding solutions. Aldo Leopold said "the oldest task in human history is how to live on a piece of land without ruining it". Activity which degrades the land should be discouraged and what maintains, restores and expands the value should be encouraged. What is pristine? Nature is in constant flux. Bill Zeedyk makes small interventions which encourage nature to do the work, rather than looking to disruptive engineering solutions. Increase economic and environmental resilience. Ecosystem services provide human well-being.

Nature's Fortune: How Business and Society Thrive by Investing in Nature by Mark Tercek and Jonathan Adams (2013)

This could be subtitled How to Have the idea of Collaborative Solutions Challenged. Tercek, the president of The Nature Conservancy, is a former executive at Goldman Sachs financial institution. His philosophy is that diversity, maximizing returns, investing in assets, managing

risks, and promoting innovation should be applied to nature. Environmentalists place emphasis on the inherent value of nature. Focusing on the tangible benefits of conservation allows government, corporations and individuals to work together.

Competition for resources and scarcity are often approached from an engineering standpoint. Controlling nature and technology provide solutions. Natural processes and market incentives are often capable of more economical, sustainable solutions. One familiar example is river water control in relation to water rights and flooding. Levees and dams have been the traditional answer, and then higher levees and more dams - and catastrophic failure. Reestablishing floodplains enables the waters to spread out over a wide area, slowing the river's flow so the channel is not deepened and sediment fertilizes the ground and maintains deltas.

Water access is more of a problem. In 2010 a United Nations resolution declared water a universal human right. No nation voted against the resolution but 41 countries, including the United States, abstained. A farmer's cooperative in the Oman Desert has equitably allocated agricultural water for 2500 years. Florida gave Nestle 10 years of unlimited pumping rights for \$230. New York City began getting its water from the Catskills in 1905. When development in the area threatened the water quality instead of constructing an \$8B filtration plant they invested \$1.5B in land purchases, and watershed sewage systems. Realistically pricing water encourages innovative conservation and prioritizes use.

In 2009 Elinor Ostrom won the Economics Nobel Prize for her theories on how shared resources could be managed for the good of all. Resources belong to everyone and there need to be rules. Banding together, developing trust, and establishing clear property rights can overcome self-interest and short term goals. Greenpeace picketed McDonald's which pressured Cargill to forego Amazon deforestation soybean production to feed beef. This isn't exactly a collaboration but an example of the using broader influence of large corporations to effect change.

Overfishing has been successfully controlled by allocating permits for specific amounts (which can be traded), identifying critical habitats, and regulating some destructive methods. Micronesia provided an alternate example of what one person can accomplish when a returnee, appalled by the local fishery depletion spent three years defending Black Coral Island in a boat, armed with a shotgun, a spotlight, and a bottle of bourbon. His protection of a critical spawning habitat increased the population sufficiently to spawn the widespread Micronesia Challenge.

Oyster reef restoration is another example. Like beavers and mangroves, oyster reefs are ecosystem creators, modifying the environment to benefit many species. But they cannot save the salt marshes themselves and returns may be too slow for private investment. Natural

systems are generally more resilient, essential as climate change makes previous assumption questionable. Sometimes addressing local problems is very effective.

Only government regulation can cope with some problems. This requires a different sort of collaboration. Mention of Nixon establishing the EPA and a climate change bill co-sponsored by Lindsay Graham, John Kerry, and Joe Lieberman emphasized that. Cap and trade legislation was effective in reducing acid rain. Ozone depletion was curtailed by outlawing certain chemicals. We need a different kind of development that does not depend upon exploitation of natural resources. Cities have been neglected. They could be denser, have smaller lawns, and encourage more walking. Controlling rainfall should be addressed. Runoff overloads sewer systems, pollutes waterways and eliminates ground water retention. Green infrastructure such as more permeable surfaces, green roofs, and water collection can be cheaper than larger sewage plants.

Responding to climate change is like tackling drug use: you can target the supplier or the addict. Regulations generally have some adverse effects. It helps to ask "how" instead of relying on saying "no". There is some acknowledgement that over population and a high standard of living are underlying contributing factors. The present non-Malthusian assumption that there are no limits to potential growth seems to be a neglected factor.

But Will the Planet Notice? How Smart Economics Can Save the World by Gernot Wagner (2011)

The previous book extolled working with nature; this one is about working with, not against, economics. Science is true whether you believe it or not and money makes the world go 'round. Then the author points out that water rising on the equator as the icecaps melt makes the world go around a teeny bit slower. He doesn't disparage individual actions but does insist that results will only come through broader collective.

The true costs of economic growth in diminished resources and environmental damages have not been included. Tercek touted consensual responses among all involved entities. Robert Coase says that government is for solving problems where the costs for individuals to get together won't lead to a desirable outcome. Only government, which is influenced by politics, can impose rules for including those socialized costs. Economics lacks response due to the concepts of a tipping point and Noah's Ark Problem. The latter requires determining critical elements instead of being distracted by higher profile aspects. The other problem is that uncertain risks and feedback produce inevitable collapse before the bubble bursts. It's too late before it's really necessary to do something. The Endangered Species Act is illustrative of the consequences of concentrating on specific species at risk of becoming extinct rather than preserving biologically diverse habitat. Fifty species survive out of 2000 listed as endangered since 1967. Owners have actually killed endangered species to avoid the adverse economic

effects.

We can no longer continue to treat air and water as common resources free to be used without consideration of the consequences. Everyone competes against everyone else; the winners get there first and take it all. The lack of management is the real problem. The Tragedy of the Commons also states that the only way we can preserve other freedoms is to relinquish the freedom to breed. There is a declining capacity for the planet to buffer itself against human impact. This is one of the few times overpopulation is even mentioned. The belief in continual economic growth gets similar recognition. Ditto for an increasingly higher standard of living as a norm. Economists focus on GNP.

Outright bans are similar to building levees. Think of the consequences of prohibition. Phasing in regulations, cap and trade, tariffs, and subsidies provide economic incentives and encourage innovation. Make market forces point the economy in the direction of transforming to a green economy. Technology and the production of clean cheap energy will dominate. Free trade agreements are supposed to make everyone richer. Manufacturing is transferred to the lowest wage countries enabling richer countries to reduce their use of resources and pollution.

Pollution could be turned into a commodity, associated with the use of a product. Wagner suggests that pricing pollution removes a moral (green - good / development -bad) aura. He earlier said that politicians like to ban things; it's decisive. Here he mentions the willingness to ban child labor and slavery. Another earlier mentioned UN proclamation was that water was a human right which no one voted against. Human well-being cannot be measured. That may make it easy to ignore -as is the well-being of the planet.

More from Less by Andrew McLeod (2019)

The author begins by saying he is in favor of carbon taxes, regulation of pollution and of trade in endangered species, nuclear power and GMOs. He acknowledges that those views will offend both traditional sides of natural resources policy. He's right. I began to feel that my sequence selection was leading me ever farther out of my comfort zone.

His optimism is based on access to accumulated human knowledge through advanced computer technology. Humans always want more. Ingenuity is their ultimate resource. This requires no depletion of natural resources and enables us to use ever fewer resources to flourish. The application of energy in the industrial revolution and the efficiency of international trade and production (codified by Paul Samuelson's theories of comparative advantage) are the means. The proof is in the rising living standard of healthy, long living humans and compact multiple use devices such as smart phones. This is despite the dire predictions of Malthus, Paul Ehrlich, etc.

Every society has a way to produce goods and services and to distribute them among its

members. McLeod proceeds to extol a capitalistic system. He favors a moderate one between the extremes of market fundamentalism and socialism. Arguments for that approach include the guidance provided by market determined prices and the necessity of including externalities such as pollution. An informed public and a responsive government with adequate enforcement ability will produce good policies and procedures.

McLeod's examples of good ideas produced and needing acceptance are an improved Human Rights Protection score (2014), GMOs, and glyphosate. Those last two certainly push my buttons as does the feeling that his only concern for earth's ecosystem is the protection of endangered species- which includes some mention of de-extinction. More objectively, McLeod's concern is for the expansion and well being of humans. Clean air and water are important for them. More efficient production of food and goods will raise the general standard of living, reducing pollution and promoting a more inclusive cosmopolitan view among the general population.

McLeod feels that the needed cooperation (which he terms social capital) depends on emphasizing fairness rather than equality. Not having a feeling of being part of something bigger promotes resentment rather than any concern for one's fellow man. Drug use, alcoholism, and suicide have increased mortality for middle-aged white Americans. There has been an increase in an intolerance for diversity, a desire for sameness. Ties to a broader shared society have been dissolved and there is no shared public awareness of facts.

McLeod's solutions and his optimism for humankind intertwine widespread shared knowledge through online dispersion with raising living standards.

These books focus on fuels and minerals as opposed to such natural resources as timber, water, and food production or anything relating to our well-being. More from Less quotes Jesse Ausbel saying we must make nature worthless to keep it economically safe from voracious capitalism. In some respects it seems that we already regard Nature as worthless except as a source of raw materials that we feel that humans can exist independent of the earth. We do not feel that our being is an integral part of the earth and dependent upon it. Nor do we consider the idea that the earth is the goose that lays our golden eggs. Which leads into the last, and earliest, book.

The Closing Circle by Barry Commoner (1971)

Commoner says that the earth is a closed circle ecosystem in which everything is connected to everything else. Man's science and the technology that results are dependent upon an analysis of parts. Our economic systems are dependent upon growth fueled by linear piecemeal solutions. As long as the goose lays enough eggs to purchase a new goose the growth systems will persevere. Both of these axioms violate the principles of a sustainable, self-correcting ecosystem. He says that the continuation of life itself was dependent upon the evolution of

decay bacteria which created a self-sustaining ecosystem. WE have disrupted that sustainability and need to restore it.

Commoner believes that the imbalance is caused, not by man's biological character, but by his social actions. He is optimistic because social action is something that can be changed. Science can be focused on working within the ecosystem. Economic and political systems can be based on production for the social good rather than for private gain or domination. Focusing on ecological reconstruction would become a self-accelerating process and encourage global cooperation.