Conservation of Living Resources in a Post-Peak Oil World

In a world overrun with humans, what fate awaits wildlife, fisheries, and forests when the fuels run short?

By Leon Kolankiewicz

Several years ago I was working as a biological consultant to the U.S. Fish and Wildlife Service, helping this federal agency prepare a long-term management plan for Innoko National Wildlife Refuge (NWR) in Alaska. This Comprehensive Conservation Plan (CCP) would provide overall management guidance for the refuge's wildlife, habitat, and public use.

The huge, sprawling 3.8-million acre (5,940-square mile) Innoko NWR is one of the remotest national wildlife refuges in the United States. It is so wild that it contains not a single human inhabitant in all that vastness; its headquarters are located in the village of McGrath, on the Kuskokwim River, some 50 miles as the raven flies from the refuge itself. In 1980, the U.S. Congress officially designated 1,240,000 acres of Innoko NWR (1/3 of it) as part of the National Wilderness Preservation System.

Given this vastness and isolation I was dismayed to find that even here the long and lethal reach of "Hydrocarbon Man" extended to impact wildlife populations. I learned that traditional villagers in tiny outposts on the outskirts of the refuge were upset because the moose populations they had always depended upon as the major or only source of meat in their diet were in decline due at least in part to intensive hunting pressure exerted by outsiders — recreational hunters flown in from elsewhere — from hundreds or even thousands of miles away. Thanks to affordable fuel and the widespread availability of bush planes (often small floatplanes that can touch down on remote rivers, lakes, and bays), guided sportsmen from Anchorage — or Atlanta for that matter — could reach and kill moose virtually anywhere in the entire immense state of Alaska.

Here in a microcosm was one small example of the pervasive reach of Hydrocarbon Man. But what will happen when petroleum products such as gasoline, diesel, kerosene, jet fuel, heating oil, propane, and others run out…or simply get prohibitively expensive as accessible, conventional reserves ("cheap oil") are exhausted? Will the moose — and by implication other critters — survive and thrive as these pressures diminish?

Moose in even the most isolated parts of Alaska are subjected to intensive hunting pressure because of the ease of aerial access due to affordable fossil fuels.

Unfortunately, it's not that simple or predictable. And the reason it's not is that when times get tough — as they are likely to when the Age of Fossil Fuels begins to run on fumes — billions of human beings in an overpopulated, overexploited world will be left to fend for themselves without the fossil energy that has permeated,

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eased, and enriched our lives in a myriad of ways for the past century and more.

At Innoko NWR, wildlife managers began to notice that subsistence hunting pressure from local bush residents decreased when the price of fuel for their outboard motors increased in the early 2000s. These hardy and self-reliant but low-income folks could no longer afford to access the refuge's more distant hinterlands by outboard motor powered skiff. This is an example of what may happen in a post-peak oil world: unless fossil fuels can be replaced at scale by renewable energy sources (e.g., biomass-derived ethanol or electric batteries recharged by solar or wind), human beings will simply have less exosomatic energy and power at our disposal to exploit and encroach upon the living renewable resources of our world — the forests, grasslands, fisheries, and wildlife. Those wildlife populations, fish stocks, and forests in environments of low human population density and at a safe distance from large human population centers may well experience less exploitation and be given a chance to recover…if, that is, they haven't already been irrevocably damaged by the global plundering currently under way.

On the other hand, wherever there are fairly large numbers of people, with ample stockpiles of ammunition and arms at the ready, I would expect there to be widespread poaching — nay, uncontrolled slaughter — of anything that moves on four legs which is edible — from squirrels, woodchucks, and muskrats to deer, wild boar, and bear, all of which can be eaten.

Modern food production is highly dependent upon fossil fuels. As the late Professor Al Bartlett used to quip, modern agriculture is the use of land to convert petroleum into food. Thus, in a post-peak-petroleum world, the output of industrial-scale agriculture will almost certainly contract, perhaps substantially; in turn, commercially produced and marketed food is likely to become much costlier overall and in some times and places simply unavailable altogether. When hunger stalks humans *en masse* and without quarter, humans will stalk wildlife without quarter. As an old hillbilly from Appalachia once told me, in describing his own pragmatic, survival-of-the-fittest philosophy towards other living things: "if it moves, shoot it; if it don't move, chop it down."

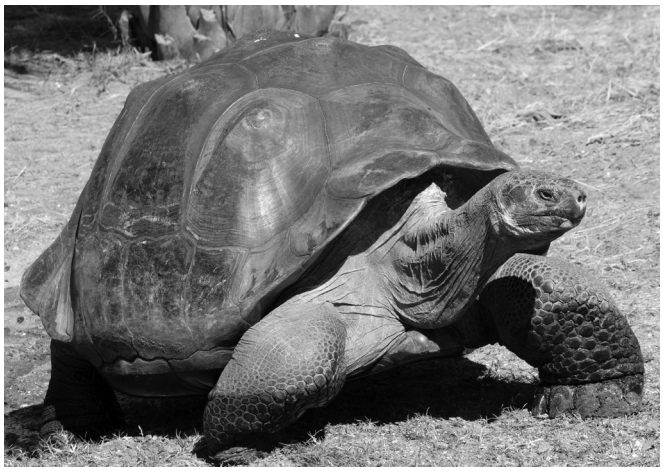
During my experience as a Peace Corps volunteer in Honduras in the late 1980s, I was helping this impoverished country try to save its few remaining wild places and wildlife populations from rampant, uncontrolled pillaging. But wild places and things were literally under the gun. It was an uphill struggle because of rapid population growth, hunger, lacks of jobs and income, the availability of axes and saws, and the proliferation of cheap bullets and firearms such as .22 caliber rifles, which are durable and can last for many decades. Wild game such as iguanas and deer, both edible and tasty, had been effectively extirpated from most of the country by hungry Hondurans. I was trained as a wildlife manager, but there was little wildlife left to manage. Whatever rules and regulations there may have been on paper, on the ground there was no such thing as open or closed hunting seasons or bag limits or wildlife sanctuaries; it was open season on everything edible year-round.

A Canadian acquaintance of mine once noticed a similar phenomenon in China. He was traveling there in the late 1970s when it was still relatively closed, just before it opened up to the world, and before the historically unprecedented economic boom that skyrocketed living standards and consumption levels for hundreds of millions of Chinese citizens almost overnight and transformed the world at large in the process in countless ways. My friend was a physician, a member of British Columbia's Pollution Control Board (which set policy vis-à-vis regulating air and water pollution in this western Canadian province), and an avid bird watcher. Now, on his travels across China, he was disappointed at the apparent paucity of bird life. Finally, near the end of his two-week journey, as the train he was on passed over a bridge crossing an estuary, he managed to catch a glimpse of a heron at water's edge. Thrilled, he pointed it out to his interpreter/guide/minder. "Ah yes, very good eating!" was the response, and then it dawned on my acquaintance why he'd been seeing so few birds. The thought of eating the flesh of a scrawny, fish-eating heron was repulsive, unless you were half-starved and in dire need of protein.

Throughout the developing world, national parks and wildlife sanctuaries have been justified and established not just to conserve habitat and wildlife, but as a means of "sustainable" economic development and providing jobs to surrounding rural residents through ecotourism. People are given an economic incentive — bribed, a cynic might say — to protect and manage forests and wildlife they would otherwise invade, chop down, and shoot out. The national parks and wildlife reserves of Costa Rica, Africa, and the Galapagos Islands are all fine examples. Ecotourism and safaris have become a multi-billion-dollar industry worldwide. But what will happen to all of those elephants, zebras, impalas, wildebeests, marine iguanas, sea turtles, and tortoises should the flow of tourists and their dollars ever dry up because air travel has become too expensive due to high jet fuel prices? The super-rich may still be able to continue their jet-setting to exotic locales, but not the millions of middle-class eco- and adventure tourists, the steady flow of which is needed to sustain a viable industry and its associated jobs, income, and tax revenues.

When and if this occurs, the situation of the very wildlife attractions that are now the draw and destina-

tion for tourists will turn precarious. The tortoises and the elephants (if any have survived the current poaching pandemic) will become very vulnerable to the very human neighbors whose economic wellbeing they once helped nurture in better times. They will be killed for food or body parts (e.g., ivory from tusks), or because they compete for food or space humans need to grow food, or perish because humans invade and destroy the habitats they need to survive once those habitats no longer serve to attract tourists and adventurers and their money.



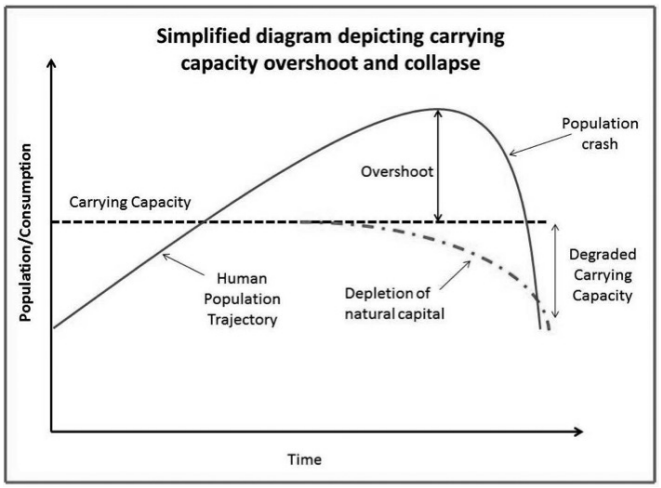
Galapagos tortoise

There have already been incidents that presage this unfortunate reality — for example, in the Galapagos Islands that so inspired a young naturalist named Charles Darwin in 1831. Essentially uninhabited until relatively recently, the human population on these islands exploded once Ecuador formally designated Galapagos National Park in 1959 and tourists began arriving in droves to take in the other-worldly scenery, the marine iguanas, the tortoises, and, of course, Darwin's finches.

The upshot is that Earth's population of 7.3 billion vastly exceeds the sustainable carrying capacity of the planet. The population boom of the last two centuries was only made possible by the discovery and ever more intensive exploitation (through brilliant technological innovation) of rich deposits of fossil fuels and mineral lodes that took tens of millions of years to accumulate through natural processes. With the inevitable depletion of these concentrated stocks of non-renewable resources, humanity will suddenly find itself in the perilous position depicted in the "human population trajectory" curve of the carrying capacity "overshoot and collapse" schematic shown in the figure opposite. Or as others have noted wryly, in the situation of Wile E. Coyote of the classic "Coyote and Roadrunner" Looney Tunes cartoons, who pursues the elusive, enticing roadrunner so blindly and with such abandon, that he runs right off a cliff. There he lingers in the void improbably for a few moments of eternity, before plummeting into the abyss below. And a tiny exquisite puff of dust appears on the desert floor below to mark the end of his plunge.

Renewable natural resources such as wildlife, fisheries, forests, grasslands, water, and soils are forms of natural capital, and as collapse occurs, in general these resources would be depleted and degraded as shown. However, as noted above, those resources that are located in remote, inaccessible locations of low human population density — high seas pelagic fisheries stocks, boreal forests or taiga and the wildlife they furnish habitats for, Arctic tundra, steep mountain slopes — may actually fare better during collapse, as human exploitation is increasingly curtailed by energy constraints and fewer numbers of human consumers to gnaw at them.

About two centuries ago, just before the advent of, first coal, and then oil, the global human population had reached the one billion mark, after tens of thousands of years of excruciatingly slow, incremental growth, marked by periodic culling setbacks such as the bubonic plague. Almost all of the energy in use at that time was non-fossil fuel: heat energy from burning wood, chemical energy in the covalent carbon bonds of food eaten by humans and draft animals. In a number of places that lent themselves to it, hydropower was used at mill sites to produce flour from wheat, and so forth. All of this was solar "income" or flow, and it was renewable. Moreover, humans were able to tap into just an infinitesimally tiny fraction of the shockingly large flow of solar energy onto the planet.



Even so, with just 1/7th of the global population we see at present, pre-Hydrocarbon Man was not living sustainably or lightly upon the Earth. Magnificent megafauna such as the mammoths and mastodons had been obliterated by early man over vast areas even before the advent of agriculture. Overpopulation afflicted much of Europe, portions of China and India, and elsewhere. Moreover, across the centuries human beings of many

cultures and places had unwittingly long since overused, over-exploited, and degraded vast areas of the biosphere, including much of the heavily populated Central American highlands, the Mediterranean basin in southern Europe, the once-Fertile Crescent of Mesopotamia, and North Africa. Many areas had been deforested to provide wood for heating and cooking and to make way for crop cultivation. American diplomat and naturalist George Perkins Marsh wrote about this in his classic 1864 book *Man and Nature; or Physical Geography as Modified by Human Action*.

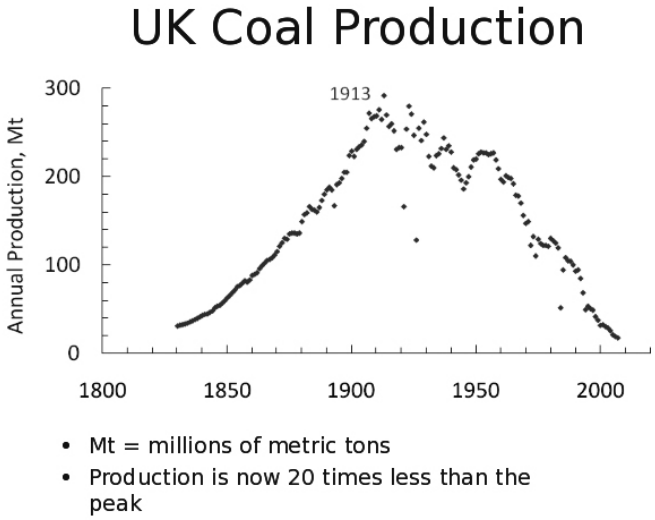
George Perkins Marsh (1801-1882)

A genuine Renaissance man and polymath of astonishing vigor, Marsh practiced law, reported to the Vermont Legislature on the artificial propagation of fish, and became fluent in half a dozen European languages during his long sojourns on the Continent. In 1849, President Zachary Taylor appointed him as U.S. minister resident to the Ottoman Empire, where he promoted religious and civil tolerance in that empire's waning decades. In 1861, President Lincoln named Marsh as the first U.S. minister to the Kingdom of Italy.

In *Man and Nature*, based on his study of long-inhabited lands around the Mediterranean Sea, Marsh wrote that, "the operation of causes set in action by man has brought the face of the earth to a desolation almost as complete as that of the moon."

Beginning in the 1600s and 1700s, and accelerating in the 1800s, Europe's overpopulation, land overexploitation, and deforestation were alleviated both by the large-scale migration of tens of millions of Europeans to the Americas as well as by inventions associated with the Industrial Revolution. There were not enough remaining forests and wood in the U.K. to provide the much greater quantities of energy needed for this colossal transformation, but coal production in Wales, England, and elsewhere boomed, until it didn't anymore. Oil took its place.

With exponential growth in North and South American human populations during the colonial era, resource exploitation and overuse in turn grew exponentially. Wildlife and biodiversity suffered terrible losses.



In essence then, we cannot assume that without any fossil fuels at our disposal, the Earth could long support even the population of one billion humans alive at the onset of the Industrial Revolution and the Age of Fossil Fuels. And the uncontrolled population decline (aka collapse) that *The Limits to Growth* foresaw four decades ago as the inevitable outcome of the business-as-usual scenario would not occur without unprecented damage to the Earth's environment and remaining resources.

What can avert this tragic fate? Some fatalists would argue that nothing can, that our brittle industrial civilization is inherently unsustainable and is doomed to collapse sooner or later. Green optimists and cornucopians beg to differ, and have faith that humanity still has enough time, capital, resources, and cooperative spirit to make the difficult but doable transition to a civilization based on renewable energy resources that can effectively last for as long as the sun shines. I, for one, remain unconvinced by either side. What I do know for certain is that for the foreseeable future, all other living things on Earth will be profoundly affected for better or worse by the decisions (or indecision) and actions (or inaction) that 7.3 billion human beings take. ■