

This book by an EPA insider reviews the history, science, and law of pollution control. It displays the tools available now to control man-made climate change. It inspires concerned citizens, especially younger people who will inherit a dangerous planet, to join in saving our life on Earth.

Fighting Pollution and Climate Change
An EPA Veteran's Guide
How to Join in Saving Our Life on Planet Earth
by Richard W. Emory, Jr.

Order the complete book from the publisher [Booklocker.com](https://www.booklocker.com)

<https://www.booklocker.com/p/books/10724.html?s=pdf>

or from your favorite neighborhood
or online bookstore.

**AN EPA VETERAN'S GUIDE HOW TO JOIN IN
SAVING OUR LIFE ON PLANET EARTH**

FIGHTING POLLUTION AND CLIMATE CHANGE



RICHARD W. EMORY, JR.

Copyright © 2020 by Richard W. Emory, Jr.

ISBN 978-1-64438-069-7

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means electronic, mechanical, recording, or otherwise, without the prior written permission of the author.

Printed on acid-free, crème paper.

Library of Congress Control Number: 2019918191

Library of Congress Cataloguing-in-Publication Data

Emory, Jr., Richard W., 1941–

Fighting Pollution and Climate Change: An EPA Veteran's Guide

How to Join in Saving Our Life on Planet Earth / Richard W.

Emory, Jr.

BookLocker.com, Inc.

2020

First Edition

Disclaimer

This book is not approved, endorsed, or authorized by the U.S. Environmental Protection Agency, and the retired badge pictured on the cover does not imply any official authority then or now. While Richard Emory was never a federal Special Agent, he is proud to personally own and in retirement possess honorary EPA gold badge number 2, portrayed on the book cover. It was awarded at the conclusion of his service as nationwide legal advisor to EPA's Special Agents, numbering about 100 brave men and women investigating the worst (intentional and sometimes with a dead-body count, thus criminal) cases of pollution. Not to be confused with or worn as a credential, this commemorative badge is permanently mounted on a plaque bearing these words: "For outstanding service as Acting Director of the Criminal Enforcement Counsel Division of the Office of Criminal Enforcement..., by providing sound legal advice and national management to achieve a fair and effective program of environmental criminal enforcement."

Contents

| | |
|---|-----|
| Introduction | 1 |
| Chapter 1—Extinctions, Past and Present..... | 3 |
| Chapter 2— <i>Semper Paratus</i> in the Coast Guard..... | 27 |
| Chapter 3—Rachel Carson, Muse of Nature..... | 41 |
| Chapter 4—Waking Up to Toxic Waste..... | 57 |
| Chapter 5—Headquarters, U.S. Environmental Protection Agency | 71 |
| Chapter 6—Speaking Truth to Power..... | 89 |
| Chapter 7—Saving the Earth | 115 |
| Chapter 8—Missions to Paris | 139 |
| Chapter 9—Climate Change | 169 |
| Chapter 10—Herr Professor Doktor: Lessons from Germany | 185 |
| Chapter 11—Clean Energy from Here to Eternity | 213 |
| Addenda..... | 237 |
| Bibliography..... | 271 |
| Index..... | 277 |

Introduction

I WRITE THIS BOOK BASED ON MY FIRM BELIEF that the United States Environmental Protection Agency (EPA) as soon as possible must be revived and then greatly strengthened if humanity is to avoid climate chaos and mass extinction. While I seek to motivate and enlist pollution fighters, young and old, this book is also both a critique and a paean, mostly a song of praise for what the Agency once was and must become again if humanity is to survive on this planet. EPA brought clean air to America, climate change is just another air-pollution problem, and EPA must lead the world in stopping it. I do not hesitate to state lessons learned that today's leaders and our posterity should know and act upon without repeating mistakes or wasting any more time.

This book is to demonstrate to any person how you too may join in. While my path was the law, there are so many, many fields of science and engineering where you can make a big contribution. Artists, writers, economists, law-enforcement officers, policy makers, political leaders—all are needed. If you can identify your skills and train yourself to use them, and if your passion is protecting the public health, natural resources, or any part of our little planet, your career will be as full of joy as was mine. All fields will eventually intersect with the law, so it will be useful that you read here the story of a pollution-fighting lawyer. If you are an older person, a mature citizen already concerned about our planet and perhaps even a leader in your sphere of influence, you too—especially and right now—are needed as a pollution fighter.

Fighting Pollution and Climate Change: An EPA Veteran's Guide How to Join in Saving Our Life on Planet Earth is mostly issues-based. Some chapters are mostly about science and technology, and how they intersect with economics, public policy, and law.

Fighting Pollution and Climate Change

The first chapter will look at human-caused extinctions facing wildlife, and following chapters will cover toxic-waste dumping of hazardous chemicals, man-made holes in the ozone layer needed to protect us from the sun, the unnatural pesticides and other contaminants that we allow and even choose to put in our food supply, and the climate chaos that we are bringing upon ourselves. These chapters will focus on solutions no less than problems. The last chapter presents the solutions to protect our climate.

Alternating chapters are partially autobiographical, but only as an organizing framework useful to covering the issues while demonstrating the human side of public service. My life of working through recent environmental history, as a state, national, and international pollution fighter, should be instructive to new environmental protectors. The first half of my public service, at both the state and national levels, was to enforce science-based pollution-control laws—crime fighting. As a “happy warrior,” I found it thrilling to work to take criminals down and off the field. In the second half of my career, often as a teacher I worked internationally in USEPA’s mission of foreign assistance. Despite heavy challenges, most of the time it was a pleasure to have the honor to represent our nation.

While parts of this book may be ponderous, other parts should be fun. While making links to recent events and to history, I hope to entertain you with stories of some adventures, including official assignments to work in Paris and to teach in Germany. In most planet-protection work, there indeed is much “joy” to be found by any person who loves our Earth.

Chapter 1—Extinctions, Past and Present

OUR PLANET IS LOSING ITS LIFE. The Earth's climate is now deteriorating rapidly, and disaster—even human extinction—is now coming into view in the not very distant future. The cause is one more, man-made, air-pollution problem now threatening even the planet's most invasive species, us. The geochemical dynamic for extinction is explained in the science book *Under a Green Sky*, by Peter D. Ward (Harper Collins, 2008). The book's subtitle reads: "Climate change, the mass extinctions of the past, and what they tell us about our future." Professor Ward describes how, in four of Earth's extinctions during the last half-billion years, excess carbon dioxide starting at the level of 1,000 parts per million (ppm) caused the oceans to become poisoned with deadly hydrogen sulfide. He tells us that this chemical, being emitted from the sea as gas, turned the sky permanently green and killed most life on land.¹

Paleontologists and geologists confirm that since life on Earth began about 500 million years ago there have been five mass extinctions.² They tell us that there are accurate and close correlations to be made between global average temperature, sea-level rise, atmospheric CO₂, and mass extinctions. Man-made air pollution is the cause of climate change leading to the mass extinction that may end the gradual sixth extinction now happening and accelerating. If we continue with business as usual burning fossil fuels, leaking methane and refrigerants, and in other ways also thoughtlessly damaging the climate, possibly in about 200 to 250 years we will have so poisoned the sea and the air that it does seem that humanity will join in the sixth extinction.

To set the stage for this book about fighting climate pollution, this first chapter is much about the life our planet has already lost and is losing now at the hand of man, that part of the sixth

extinction caused by bullets, poisons, traps, and man's other physical tools of kinetic death. Any day now, the gillnets of Mexican fishermen could drown the last of the vaquitas, doll-faced porpoises only about five feet long. If they are not yet extinct, now perhaps only about ten remain alive. The smallest of all cetaceans, an adorable elf of a whale, today the vaquita is about to become a myth and a memory.

Preventing such tragedies is the job of wildlife officers, who like pollution-control officers share the large field of natural-resource and environmental protection. But it is pollution fighters, both volunteers and employed, and not wildlife officers, who can prevent the completion of the sixth extinction by controlling and ending climate-killing air pollution. Accompanying them will be many other professions, especially engineers of all types needed to build the new, clean-energy sources and to relocate so many cities to higher ground inland.

I did not know about climate change before I was well into my career at the U.S. Environmental Protection Agency. I never imagined that I would become, even briefly, the nation's top lawyer for federal investigations of pollution crime. But the foundations for my life as a pollution fighter began 50 years earlier in the 1940s, when I was a child living on the coast of Maine.



At the sounding of the horn, some women—permanent residents of our little town—grabbed their sharpest knives and rushed out their front doors. In the street they were joined by hungry cats, and excited children like me, eight years old and attracted to commotion. We all rushed down the road to the harbor to see coming in from the sea the sardine transport boat arriving at what we called “the fish factory.” Being halfway “down east” in Brooklin, Hancock County, Maine, these town women anticipated a rare payday.

After being lifted out of the hold of the transport boat, the little fish would travel down a long, watery sluice roofed over to keep out the gulls. Their cries were loudly calling their companions, arriving now in numbers enough to have eaten the entire catch, but only the boldest came in under the roof. Standing along the sluice, the aproned women sliced, sorted, packed, and threw enough scraps about so the town cats never left hungry. The smells, sights, and sounds—squawking, meowing, heavy motors running, the women talking and their knives flashing as they worked, water rushing down the sluice—were irresistible to me and the other town children there too. Then the sardine carrier's hold was emptied, all was packed, and “the fish factory” became empty and silent.

The women returned to their homes. They put some cash in their dresser drawers and resumed preserving summer fruits and vegetables to keep in their cellars against the long, lean winter to come. In late August, the evenings became chilly and dark early, and in the night sky we might see glimmers of the *aurora borealis* that we called the “northern lights.” All too soon it would be September, and I would be taken 600 miles south to my parents' home in Baltimore. There during another long school year in a big city, I would be wanting and waiting to return to my small town by the cold sea.

Finally, June would come again, and we summer people would reappear in town. Until July, most mornings our harbor would be unseen until the sun could burn off the fog. Another summer had come to the coast of Maine, and then would come another, but the big sardine boat never returned. Sometime in the 1950s, the fish factory was sold to become a boatyard for building and repairing the yachts and small pleasure boats of summer that were replacing year-round working boats. A way of life was shifting because of new realities. Fish-factory jobs were surely tough, low-paying, and intermittent, and in 2010 the last Maine sardine factory closed. Whether the year-round people of the

town considered this change to be for the better or worse, I cannot say. To me the arrival of the sardine boat is a shimmering memory of big excitement during carefree and glorious summer days. But a way of life was ending, and in 1959 my childhood would end too.

Long since I was so lucky to have been a summer child living in my grandmother's home on the Maine coast, I have wondered—did the sardines disappear from overfishing, did foreign countries catch and can them for less, or was it because the East Coast market taste shifted to lobster and tuna? Today, I contemplate the fish factory as a mystery of nature in relation to the impact of man. Now we know that around the world many fisheries have been exploited to the point of commercial extinction. Man-made plastics are being eaten by and killing marine animals, birds, and fish, and scientists say that in a few decades there will be a greater weight of plastics than fish in the sea. Maine lobsters, while still plentiful and very profitable with many customers now in China, are beginning to shift their range northward to Canadian waters because of the warming of Maine waters. This warming also is impairing the soft-shell clams by bringing in invasive green crabs and milky ribbon worms. These predators, along with toxic red tides until now rarely occurring in New England waters, are reducing clam harvests needed for fried clams, chowder, buckets of “steamers,” and clambakes on the shore. As the climate changes, it is possible in future decades that the lobsters and clams may disappear like the sardines. In 50 years, for today's children now on the Maine coast, digging at low tide for clams, like seeing lobster boats going and coming—these too may become just shimmering memories of a colorful way of life gone by.

I did not know it at the time, but about 100 miles south of my grandmother's house on the Maine coast, from the early 1950s, lived Rachel Carson. Here she was quietly writing her book *Silent Spring*, published in 1962, which opened many eyes and caused

her to be seen by many as the mother of modern environmentalism or ecology. While she was an oceanographic scientist who understood what she was seeing, and I was an unknowing child, it happened that separately yet in the same years we each liked wading into tidepools to lift the seaweed to reveal little hidden creatures and smell the salty brine. We each liked peering down from a rowboat to see the life on the bottom of a harbor, and picking up starfish and sea urchins at low tide. We each liked walking among the whispering spruce and fir trees of a little island, hearing the waves splatter on the rocks of its windward shore.³ While she was coming to the end of her life's work, as a child and then a teenager I too was absorbing the magic of the Maine coast, forming lifelong interests and values that would lead to my own life's work. Always remembering the legacy of Rachel Carson, and in the hope that others will do the same, this book is in part the story of how a person may well follow along her path in life.

Rachel Carson wrote about science clearly and simply, and often almost poetically. Here are some of her words:

It is a wholesome and necessary thing for us to turn again to the earth and in the contemplation of her beauties to know the sense of wonder and humility.

Those who dwell among the beauties and mysteries of the earth are never alone or weary of life.

In every out-thrust headland, in every curving beach, in every grain of sand there is the story of the earth.

Rachel Carson understood and loved the sea, which covers 70 percent of the surface of the Earth. I also love the sea, yet my book due to length limitations does not give the sea the full exploration it deserves. The decline of the health of the sea is caused by human attitudes and behavior mostly occurring on the land, so I have made the 30 percent that is land the locus of this book, knowing that all things eventually flow into the sea.

Fortunately, steering in Rachel Carson's wake is Peter Neill, a thinker who writes with passion and eloquence about saving the world's oceans and water sources:

...I hear it again and again...presentation of the overwhelming problem[s of the sea] followed by silence, not solutions. It is as if we are sailing along the edge of an abyss; we have the skill perhaps to keep going, to extend our way for a time, until we fall off into darkness, or we can apply that skill to our ship and change course, away in a new direction. It is dangerous and uncertain, but I submit that we have no choice but to set forth.⁴

As you will read in a following chapter, with her life and message Rachel Carson inspired good people and good laws that certainly have saved some endangered species. But since she died in 1964, too little has been done to limit wildlife depletions and extinctions that man is causing on sea and land all around the world. The North Atlantic subspecies of the largest whale in the sea, the so-called "right whale," today is threatened by ship strikes and fishing nets off Maine and the Canadian Maritime Provinces. The National Oceanic and Atmospheric Administration describes this whale as almost extinct. It may soon join its cousin the tiny vaquita, all extinguished at the hand of man. For so many more species, mass extinction is now in sight because of the climate chaos coming. And yet the U.S. Department of the Interior has neglected to place humanity officially on its endangered species list.

As we begin to address the fate of all life on our planet, let us consider these questions posed to us by Rachel Carson:

... to open your eyes... ask yourself—What if I had never seen this before?

What if I knew I would never see it again?



Before we consider, in another chapter to follow, how human carelessness with air pollution now threatens humanity, we will first look into extinctions facing wildlife. Humanity has been causing Earth's sixth extinction, with species exterminations accelerated since perhaps 11,000 years ago at the ending of the last ice age. To begin tracing the history of the sixth extinction, let us visit the North Sea, where fishermen today in their nets may pull in not just sardines, but femurs four feet long and other gigantic bones raised from the seafloor. Woolly mammoths and mastodons were hunted and eaten by our prehistoric ancestors, but here they did not eat them all. During the last ice age, when sea levels were much lower, today's seafloor between England, the Netherlands, and Norway was dry; this area was called "Doggerland." Whether drowned slowly by the sea rising as the planet warmed, or by a seismic sea wave when Norwegian submarine mountains collapsed, some mastodons or woolly mammoths drowned naturally as Doggerland became the Dogger Bank, today a place for commercial fishing. But human appetites are not to be underestimated.

Like the town cats scurrying to the arrival of the sardine boat in Maine, early Europeans too were usually cold and always hungry. They probably did eat every last giant ox—the auroch—famously painted in the caves of Lascaux in France. Of course, they were just early and unwitting followers of today's stylish "paleo" or "Atkins" diet! In North America, humans arriving from Asia ate all the camels, zebras, and horses. Yes, there were indigenous horses long before the arrival of Spanish *conquistadors* whose mounts escaped and repopulated the American West. Once extinct on continents, some species survived on islands. But, with the invention of high-seas vessels, then came sailors. Seventeenth-century Dutchmen landing on the island of Mauritius found the dodo bird, a 50-pound flightless pigeon, so curious it walked up to greet the sailors coming ashore with firearms and appetites. Roasted dodo birds tasted so delicious after too many fish dinners on sailing ships. So the

sailors ate them all. In the last 400 years, more than 500—some say 800—extinctions of animals, and more than 600 extinctions of plants, have been documented, and the pace of extinctions is accelerating.

European settlers arriving in North America shot all the Carolina parakeets and all the passenger pigeons. It is an amazing feat that relatively few hunters could kill about four billion passenger pigeons. They shot them as cheap food for themselves and their slaves and because they were pests to farmers' crops. Like the cavemen in who sketched the auroch, we can thank John James Audubon who in the 19th century arrived in the U.S. just in time to paint some of the last of these birds that we will never see alive.

In the American "Wild West," adventuring hunters and settlers almost exterminated the American bison...we call it the "buffalo." Nineteenth-century European-Americans shot them for their skins and even for sport, sometimes from windows of the first steam trains, often leaving their bodies to rot on the ground. This was government policy as part of the ethnic cleansing to starve and remove the Native Americans living on the Great Plains east of the Rocky Mountains. To quote U.S. Army General Philip Sheridan: "Let them [white adventurers and settlers] kill, skin, and sell until the last buffalo is exterminated...to bring lasting peace and allow civilization to advance." White men killed perhaps as many as 50 million buffalos, leaving only about 2,000 surviving.

During the 19th century in the far northwest in today's State of Washington, Chief Seattle led the Duwamish and Suquamish tribes. He worried about the invasive white men taking the salmon, trees, and lands of his native people, reportedly saying:

What is man without the beasts? If all the beasts were gone, men would die from a great loneliness of spirit. For whatever happens to the beasts, soon happens to man. All

things are connected.... Whatever befalls the earth, befalls the sons of the earth. My people resemble the scattering of trees—fallen—on a storm-swept plain.⁵

We are fortunate today to have the example of a very energetic young gentleman from New York, who while adventuring in the 1880s in the Wild West, had observed the disappearance of buffalos, other wild game, and even their habitats to the overgrazing of cattle. He then became alarmed by the disappearance in Florida of plumed wading birds, harvested for their feathers that sold by weight exceeding the price of gold in New York City, London, and Paris. “TR” or “Teddy” Roosevelt in his day became world famous for many reasons, including his well-publicized refusal to shoot a lame old bear held captive on a rope. This image took shape as a stuffed toy, the “Teddy Bear,” that became the enduring symbol of a child’s natural love for animals. Theodore Roosevelt would be the first to put high on the national agenda the conservation of natural resources.

In 1900, Roosevelt helped Congressman John Lacey pass the first federal law to protect birds and game animals shipped in interstate commerce. Officers began seizing bird feathers and skins, and the “Lacey Bird and Game Act of 1900” saved many wildlife species (of both plants and animals) from extinction by outlawing their harvesting, hunting, and interstate shipping to market. But illegal taking (“poaching”) and transporting across state lines continued, so beginning in 1901 Roosevelt, by then the President, protected about 230 million acres as national wildlife refuges, national forests, and national monuments, including lands that became many of the first national parks. Only on federally protected lands could the birds and animals live entirely safe from hunters.



While Teddy Roosevelt showed us the way forward within the U.S., we should remember the careless behavior of our ancestors.

And we should be aware that today it is modern buyers often from supposedly sophisticated nations who continue pushing wildlife toward extinction. The Lacey Act has since been updated beyond interstate trade to also apply to international black marketers and traffickers. It prohibits the import into the U.S. of animals and plants (whether live, dead, or made into products) that are either on the U.S. list of endangered species, or even if they are only protected by laws in their home countries that may be far away. This is a far-reaching and very powerful law, enthusiastically enforced by the officers of the U.S. Fish and Wildlife Service of the Department of the Interior. But alone it cannot save many species native to foreign lands.

As the first three examples of “charismatic megafauna”—big, appealing, or fascinating mammals—that are in big trouble today, consider tigers. Their habitat is steadily lost to human settlements that eliminate as food their natural prey. But worse is “poaching” to obtain tiger pelts, teeth, and claws as marketable decorative items. Tiger bones are harvested for use in traditional medicines by Asian consumers who wrongly believe they can treat ulcers and burns, rheumatism, heart ailments, liver disorders, fever—and that they can somehow strengthen human bones. Whiskers are thought to magically treat toothaches. Eating a tiger penis is said to be aphrodisiac. So today fewer than 2,500 breeding adult tigers are left in the wild, and their numbers are declining. Extinction in the wild is clearly in view for tigers.

The rhinoceros also has been hunted, some subspecies to extinction, others to the brink. After a rhino is killed, the horn is removed and smuggled to Asia, where many believers in traditional medicine imagine that pulverized horn is a magical pharmaceutical to cure almost any ill. Reports are that rhino horn may be sold for as much as \$65,000 per kilo. In truth, rhino horn is just keratin, and an ill person by consuming his own toenails would improve his health no less than by consuming rhino horn.

For African elephants, it is the same, tragic story. After killing an elephant and removing just its massive tusks, in Japan, China, and throughout Southeast Asia they are carved into statues, trinkets, and adornments that can be very beautiful. These are often sold in luxury hotels where prices may be quoted in U.S. dollars. For decorative items made from the bodies of many endangered species, China has been the biggest market and the U.S. is second. The international market for tiger and elephant products has its parallels in the market for so-called “blood diamonds” mined by warlords in Africa, and in the U.S. market for narcotics from the murderous syndicates of Latin-American drug traffickers.

I am sure that my readers all love most animals, but lest we good citizens feel too self-righteous about whatever we are doing to save wildlife, let us realize that the popular demand in our supposedly civilized nations causes crime and official corruption here and in many troubled and distant countries. Buyers may be our friends and neighbors, and they may make their purchases on the Internet. The International Fund for Animal Welfare (IFAW) reported that the U.S. is responsible for more than two-thirds of all Internet trade in illegal wildlife, ordering online and importing almost ten times more than the next two countries—the U.K. and China. The global value of all illegal wildlife trade is estimated to be \$10 to \$20 billion annually, and after narcotics, wildlife is the world’s third largest illegal trade.

In 1973, to protect wildlife the world signed the Convention on International Trade in Endangered Species of Flora and Fauna (CITES). This treaty addresses international sales by attempting to separate harvesters and poachers on one continent from their customers far away in other countries. Guards in the field attempting to protect wildlife at the source are soldiers in a war with organized local outlaws who supply international cartels. Now the criminals come with their own helicopters and night-vision goggles for aiming their automatic weapons. A World

Wildlife Fund survey found that two-thirds of all guards have been attacked by poachers, who do not hesitate first to kill the guards and then to kill animals (*fauna*) to supply markets in wealthy nations far across sea. Despite the best efforts of many good people, as wildlife numbers continue to decline, we cannot say that CITES has not been a failure.

So imagine yourself in the native market examining those nice tortoise shells, or a reptile-skin belt. Often it will not be obvious that a polished and charming tourist curio is even made from fragments of a dead, protected animal. As a tourist who does not want to become also a criminal, you must know with absolute certainty what dead animal it really is made of, and also that it is not illegal. Of course, the friendly shopkeeper will assure you that your purchase is from a legal variety. But in any case, how can you be sure? Why would you believe this? Only a scientist or trained officer—who can talk the language of taxonomy from top to bottom, from the phylum, class, order, family, genus, all the way down to the subspecies at the bottom—will know for sure. What are we tourists to do? The best advice is that you cannot possibly know the truth. Unless you are extremely knowledgeable as an expert, don't even think about buying anything dicey to bring home. Tourists returning to the U.S. will be greeted by experts in uniform who very well know the biological and botanical taxonomy. The officers of the U.S. Fish and Wildlife Service are very good at spotting illegal imports. In the spirit of Teddy Roosevelt, you will find the U.S. government very serious about CITES enforcement. Even if you can convince the arresting officer that you are an innocent tourist who was duped by a slippery salesman far away, federal agents will seize your items and you will pay a large fine.

Endangered plants (*flora*) are also protected by CITES and the Lacey Act. The actual CITES list is very long and very complicated, and among these are many subspecies of corals. Beyond harvesting for souvenirs, corals are diminished by fishing

using dynamite, anchoring boats on reefs, and land-based pollution. But corals' biggest problem by far is carbonic acid and heat from carbon dioxide emissions—yes, global warming. Of all CO₂ and heat from burning fossil fuels that man has pumped into the air, about 92 percent of this is then absorbed into sea. We can be happy that the sea is so dense and absorbent, because if all this heat were to stay in the air, average global air temperature would exceed 120°F and on land we would be dying like flies. Instead of us, first to go are the corals in the sea. Now almost everywhere, corals are showing signs of “bleaching” into skeletons that soon will crumble into sand. At the present rate of decline, very soon, perhaps by 2030 and probably by 2050, scientists now tell us that 90 percent of coral reefs will be gone, and without this habitat, the reef fish disappear too. Our great-grandchildren probably will never snorkel to see beautiful reefs with colorful fish. This loss is likely to be inevitable, one might say “baked in,” as mankind's first, complete destruction of a global ecosystem.

Now let us all leave the reef and come back into port to stand with the customs and wildlife officers catching professional smugglers of live animals. In freight shipments, officers have found live fish in waterproof sacks, baby birds stuffed in plastic tubes, turtles in snack-food boxes, and pythons in garden pots. In luggage they have found spiders hidden in film canisters, bird and reptile eggs hidden in clothing, and snakes coiled in stockings. Worn under clothing, officers have found live lizards taped to the chest, and even pygmy monkeys worn inside a man's undershorts! Perhaps this last example was a career highlight for the arresting officer, and it does seem amusing. But the penalty for such clandestine, commercial smuggling is up to 20 years in U.S. federal prison.

For an officer inspecting imports, most of the time the job is frustrating and may seem almost impossible. Contraband can be hidden almost anywhere—imagine a few hundred locked

shipping containers on just one pier, or a land port of entry with dozens of large trucks impatiently lined up for clearance. The list of illegal goods is long, and it includes trafficked people who may be close to death. Officers surprised by animals in luggage or containers may receive scratches, bites, stings, and poisonings. Other cargoes are far more threatening. Consider the challenge of sampling canisters that may be under pressure or drums of chemicals, which may or may not be properly labeled with a skull and crossbones and other warnings that a cause of death is within. Contents may be pesticides or gases that can destroy the stratospheric ozone layer, prohibited not by CITES but by other global environmental treaties. Everyday bolt-and-lock cutters will not open a steel container, and without an environmental technician on site wearing a chemicals hazmat or “moon” suit and able to use technical sampling equipment, no customs officer can be expected to open and inspect toxic shipments alone.

Officers looking for wildlife may find almost any of a huge number of species. Their similar identities and varied legal status can be confusing, as many are protected yet have close relatives or look-alike varieties that are more common and legal. Some trade is unregulated, some is banned, and some is allowed but only if permitted. Where a species is only protected at the option of its nation of origin, legality often depends on whether it was taken or harvested lawfully in that faraway exporting nation. What actually happened there usually cannot be known by officers at the place of import, and they have to rely on permits that assure proper sourcing. Wildlife permits, like human passports, can vary from country to country. Yet unlike human passports, wildlife permits present in varied formats and in unfamiliar languages. Like passports, permits may look good but be falsified at the place of issuance or *en route*. A post may have short staffing, little training, and supervisors pressuring to clear shipments quickly to keep international trade moving.

Upon seizing a live specimen, the next problem is how to keep it alive. Without an established relationship with a nearby zoo that can help, officers at a port of entry may find it impossible to provide the needed special food, water, and temperature in a safe space to a huge variety of animals, often very young ones. The sorrow of watching them die in custody is one more burden. To conclude this overview of the work of our customs and wildlife officers at ports and borders, it is clear that they have difficult jobs, and the many honest officers deserve our respect and cooperation.



We turn now from smuggling to consider a different problem: the fate of warm-blooded aquatic mammals in the context of today's globalization and free-trade deals. Seals are "sea dogs," closely related to our tail-wagging pets who are "man's best friend." And dolphins also seem to want to talk with us; they may nuzzle us if we choose to swim among them; they seem almost human. Seals and dolphins chasing tuna on the high seas are routinely caught in the purse-seining nets of industrial-scale, large fishing boats. The marine mammals are pulled aboard with the tuna fish, and then as so-called "by-catch" they are cut up as bait or thrown dead back into the sea. Because they are too numerous to face extinction as a species, the treaty CITES does not protect dolphins, porpoises, and seals.

Without available international law to help, the U.S. government unilaterally has used the nation's wildlife laws that began under Teddy Roosevelt and since have been expanded to protect marine mammals and a longer list of other declining species including sea turtles and albatrosses. U.S. laws apply to American citizens abroad and to violators of any nation who come within U.S. territorial jurisdiction. U.S. laws prohibit import of U.S.-protected species that may come from anywhere in the world, even the high seas far beyond U.S. territorial waters and

including the Pacific Ocean off Mexico. Applying this law in the 1990s, the federal government banned imports of tuna caught improperly, and dolphin deaths dropped 97 percent. And to provide to tuna-fish consumers information and confidence that catching our tuna did not harm dolphins, the U.S. government required cans of tuna to bear a label certifying that the contents were dolphin-safe.

The U.S. law worked, but it was no match for the commercial forces of globalization operated by the World Trade Organization (WTO). The WTO ruled that the unilateral U.S. laws violated the WTO treaty's free-trade rights of Mexican tuna fishermen. To apply U.S. national laws to protect species not on the CITES list, like seals, dolphins, and many others, the WTO ruled that U.S. would have to pay punitive monetary compensation to Mexico. So today, in the name of free trade, "sea dog" and "Flipper"—as by-catch—still are slaughtered unnecessarily in very high numbers. Unwilling to withdraw from the WTO, the U.S. cannot and does not apply its wildlife laws to prevent dolphin-deadly tuna imports, or require the former consumer-information labeling rule. Similar WTO rulings have impaired the U.S. fight against many other products. For example, while the U.S. would discourage youthful smoking, today the U.S. is blocked from banning foreign imports of candy-flavored tobacco products targeting even children. Any State, such as New York, that may ban them may be exposed to jeopardy under international law; this is an issue for the future.

In Europe beginning in the late 1980s, near panic arose over the "mad cow" scare involving exported cattle. A person eating a contaminated steak within a year could like the cow also be dead of a degenerative brain disease. If an American reads the news and is a careful food shopper, more recently they may be wary of contaminated medical drugs, foods, and even baby formula exported from named foreign countries well known to be careless about the fate of consumers across the sea. Now food-

safety protesters have joined environmentalists in protesting a variety of insults to drugs and food, including imported honey found to be contaminated with lead and strange antibiotics, and even to not contain much actual honey. So the U.S. and European nations enacted laws requiring country-of-origin labeling, so-called "COOL rules," to warn consumers by naming and exposing the offending exporting country or countries in the news. But at the request of product manufacturers and commercial interests, in the name of free trade the WTO struck down COOL rules. Now shoppers cannot have labels to identify reckless source countries, and being denied this consumer information, we cannot save ourselves from putting fearsome products into our bodies.

There has been a reaction. Starting in the 1990s, often well-educated young professionals have been marching in the streets at meetings of the WTO in Europe and in Seattle, Québec, and Washington, D.C. Carrying provocative signs, some even calling the WTO the "World Terrorist Organization," they are making the news. These young "greens" are protesting that too many free-trade agreements too often shelter the lowest-cost and dirtiest production, allow the destruction of natural resources and the environment, and beyond this that the WTO shelters trade in products directly dangerous to our food and the public health. But we have seen that things can go very badly in the streets. Black-suited, masked anarchists may infiltrate a legitimate protest, using the event to break into shops, loot, throw stones, and bring down a police response even upon the mass of well-intentioned and peaceful protesters.

We should put lawless anarchists in jail and not let them distract or keep us from seeing that there is a legitimate tension or conflict between free-trade "protectionism" and planet protection. Nations often do try to block foreign competition for illegitimate reasons, and as the WTO works globally to deregulate and facilitate international trade, certainly it is not all

bad. The WTO is useful to strike down protectionist laws that only for economic reasons would unfairly shelter domestic manufacturers. The U.S. government has often benefited by using the WTO to force open foreign markets that should not be closed to competing and safe products from the U.S. The world needs a WTO to strike down false or bogus environmental, food-safety, and labor laws that are not science-based or needed but in fact are disguised protectionism.

While the WTO too frequently disregards and invalidates even legitimate labor and environmental protections, CITES is effective where a species is endangered and listed by CITES. CITES does explicitly authorize nations to block trading of species that face extinction. And being a treaty, CITES may checkmate the WTO. In addition to CITES, other environmental treaties also authorize (if not require) trade sanctions at national discretion or option. Applying international law in the ports and on the borders or frontiers of the world, to protect wildlife and the environment, national officers can and do routinely close borders against trafficking. To compel compliance by an exporting nation, an importing nation may sometimes impose a broader trade sanction or restriction on other, even unrelated products. While recognizing the benefits of free trade, we may regret trade sanctions, yet using this tool is much better than environmental disaster, or species extinction, or poisoning consumers. There is no other peaceful tool, and a trade war is better than a shooting war.

To discipline evasive or outlaw nations whose conduct is very threatening to the good order of the world, trade sanctions have been and should be expanded to block visas for offending oligarchs, prohibit tourists coming to or from rogue nations, block international banking transactions, and prohibit landings of their ships and planes. This is no different from the teacher keeping the bully in during recess to the playground, or the referee putting an athlete in the penalty box for too many fouls

on the sports field. If we were paying attention in kindergarten and high school, we would have learned the rules that are effective to create a fair and level international playing field. In a future chapter, lest humanity be added to the list of extinct species, we will consider that a future climate treaty must not only authorize but require trade sanctions that cannot be defeated by fossil-fuel interests influencing the WTO.



So as not to end this chapter in despair, the good news is that finally—at least for African elephants—new tools are at hand. Now drones are used to overfly areas where elephants roam to see poachers in action. To find where unseen poachers have been killing elephants, technicians are matching the DNA of tusks seized in Southeast Asia to the DNA in feces or scat collected from many places in Africa where elephants roam. These are the places where rangers in Africa will then know to watch for the poachers. The best news of all is that in October 2016 the Parties⁶ to CITES finally, and before it would have been too late, voted to require all Parties to close their domestic ivory markets and carving shops. China agreed, and there are reports that in 2017 China actually did this. If so, we can thank China for a big step to save elephants. Finally, there is another effective tool, although the responsible U.S. federal agencies for more than 30 years have mostly neglected to set up, advertise, and use it. To bring forth informants, the U.S. Congress since 1987 has authorized and funded cash rewards to any persons—including foreigners—who provide information about wildlife traffickers and even corrupt foreign officials bribed to look the other way. This tool needs only the right leadership to be taken off the shelf and put into use as a powerful means to develop intelligence about many wildlife criminals, and to bring U.S. justice to more of them.

Any individual wanting to help address a global problem may support an involved, international, non-governmental organization (NGO). Your annual contribution will bring to you an informative e-letter or magazine as you support their work. In addition to the previously mentioned International Fund for Animal Welfare (IFAW), one may consider the International Union for the Conservation of Nature (IUCN, also called the World Conservation Union) and the World Wildlife Fund (WWF, also called the World Wide Fund for Nature). Organizations that are more “activist” include Friends of the Earth (FOE), Greenpeace, Sea Shepherd International, TRAFFIC, and the Environmental Investigations Agency (EIA). Despite its official-sounding name, EIA is an NGO operating globally with offices in London and Washington, D.C. In my international work for USEPA, I came to really admire their law-enforcement focus and courage to do undercover private investigations, perilous work done face-to-face with international environmental criminals in unsafe, distant places. I also admire TRAFFIC, a bigger NGO focusing on CITES that is on the ground with a worldwide network monitoring the wildlife trade.

The opposite of an endangered species is an invasive species, including humans. Being extraordinarily invasive ourselves, we even collect other invasive species as pets until they get too big or eat too much. Then into ill-prepared environments we release exotics like the Burmese python, Nile monitor lizard, giant and toxic “bufo” toad, walking and armored catfish, feral house cats and pigs. These are some of the more than one-quarter of all animal wildlife that is exotic in Florida, which also has one of the world’s highest concentrations of exotic plants. Like humans, exotics overpopulate and in one way or another destroy native species. Yet there is one small part of this big problem that we can control by having a good time! Consider the gorgeous lionfish, colored orange and yellow and trailing many spectacular, antenna-like spines. Native to the Indian and Western Pacific oceans, it was probably released into the Atlantic

Ocean by Florida fish hobbyists who emptied their aquariums when their lionfish grew too numerous or large. On an excursion swimming off a beach or from a dive boat in the Florida Keys or the Caribbean, today you do not see many cardinal fish, parrot fish, damselfish, angelfish, “Nemo” the clownfish, and other harmless beauties. Most of these pretty reef fish have been eaten by lionfish. With venomous spines, their only natural predator may be a big fish with a strong stomach, the grouper.

But groupers have long been on our restaurant menus, and we the people (descended from those hungry cavemen of prehistory) have already eaten most groupers. So it seems only fair that we ravenous humans should replace the grouper as the worst nightmare of the lionfish. If you are on a tropical excursion and want to help, many fishing and dive boat captains will ask you to kill all the lionfish that you may hook or spear. The crew will bring them aboard and then ashore where lionfish are appearing on menus in local restaurants where we tourists are the top-tier predators. Their venomous spines are easily removed, and there is no possible danger in eating the flesh. So order a lionfish! The flesh is delicious, and lionfish is coming now even to some food markets, at least in Florida. Ask for it, and eat some more. Raise your glass of white wine in a toast to health of Nemo, the cute clownfish. You really will be saving Nemo by eating the lionfish.



We have been tracing various aspects of the man-made sixth extinction, now in progress, that began perhaps 11,000 years ago with the ending of the last ice age.⁷ Right now—today—we, the most invasive species, are causing other species to become extinct at between 100 to 1,000 times the natural rate before man dominated the planet.⁸ The ultimate question is, will humanity actually become extinct in a few hundred years? Barring a catastrophic impact by a large asteroid or a global

nuclear war, my personal opinion is that humanity probably will continue to exist indefinitely. As the last chapter in this book will describe, we already today have all the new technologies and proven government policies to speed the switch to climate-friendly energy that can keep humanity off the sixth extinction list. Already we see an advance guard of today's young "greens," organizing in groups with colorful names like "Extinction Rebellion." Regularly now they are marching and carrying signs like "The Seas Are Rising, And So Are We," "We Are The Tide Coming Up And In," and "There Is No Planet B." It will be a very close call, but there should be enough time for a majority of our descendants—who too many, too soon will be wading into catastrophic sea-level rise—to make controlling political decisions to act in time to save their children from climate chaos and extinction. While too many of my generation and those presently in power are either ignorant or willfully failing to act, I do believe that humanity has a future.

Those of us who are grandparents can start the process. To end this chapter where we began, recall the conservationist Teddy Roosevelt. Let us be sure that each new grandchild—who at bedtime naturally may be quite wild—has a Teddy Bear to hug and learn to love wild animals and all of nature. Let us also read to them, helping them to learn to be thoughtful and to care also for the future of the world's most invasive species.

1. Science journalist Peter Brannen followed up with his less technical book *The Ends of the World* (Harper Collins 2017) subtitled "... lethal oceans and our quest to understand Earth's past mass extinctions." Short of extinction, the extent of the devastation about to befall civilization is described in recent books, including *The Uninhabitable Earth: Life After Warming*, by David Wallace-Wells (Tim Dugan Books, 2019), and *This Is the Way the World Ends: How Droughts and Die-Offs, Heat Waves and Hurricanes Are Converging on America*, by Jeff Nesbit (St. Martin's Press, 2018).

2. The previous five mass extinctions in the last 500 million years are summarized in a one-page table in an addendum at the end of this book.

3. From Rachel Carson's first book written in 1941, she presented the mysteries of the sea in clear and beautiful words that millions of thinking people have loved. *Seaweed Chronicles: A World at the Water's Edge*, by Susan H. Shetterly (Algonquin Books, 2018), is similarly lyrical and learned. Like Rachel Carson, Shetterly describes the intertidal and subtidal zones, the fascination of their flora and fauna, and their importance to the business and people who depend on them. While considering so much the oceans have to teach us, her book is also enlivened by adventures meeting delightful, often quirky characters living on the coast.

4. In his important book, *The Once and Future Ocean: Notes Toward a New Hydraulic Society* (Leete's Island Books, 2015), Peter Neill comprehensively tells how in modern times we have brought the sea to the point of exhaustion, and offers some solutions. The quotation is from his page 25.

5. Chief Seattle (ca. 1786–1866) was tall, an orator, and a natural leader. French missionaries converted him to Roman Catholicism, and in his later years he was a philosophical and benevolent man who tried to accommodate his people peacefully to the ways of the arriving settlers. However, his exact words of more than 140 years ago have been obscured and are disputed, lost to time and the reconstructions and imaginations of publishers of many differing versions.

6. Nations that sign and then ratify a treaty are called "Parties," just like the parties to a marriage or other legal contract. An amendment or supplemental agreement may be called a "Protocol." Many names of treaties bear the French synonym, "Convention." Parties are obligated to enact national laws and establish enforcement programs sufficient to meet their treaty obligations to all other Parties. Effective national implementation of treaties is essential, because with few exceptions (such as the conventions for chemical and nuclear weapons) there is no international body with personnel authorized to inspect or conduct other implementing actions.

7. To fully explore the sixth extinction, consider a wonderful travel and adventure book by Elizabeth Kolbert. Already in 2005 she had won the Journalism Award from American Association for Advancement of Science. She then visited some of the world's most remote and interesting outposts of science, and her resulting book, *The Sixth Extinction: An Unnatural History* (Henry Holt and Company, 2014), in 2015 won the Pulitzer Prize in general nonfiction. Do read her book, she makes science fun.

8. It should be understood that the great majority of species becoming extinct are insects. One expert supporting this assertion is Edward Osborne "E. O." Wilson, a retired Harvard professor of entomology considered to be the intellectual father of biodiversity. He has published best-sellers and twice won the Pulitzer Prize. In his book *The Future of Life* (Abacus, 2002), he predicts that half of all species on Earth, most of which are insects including beneficial ones, will be extinct in 100 years if present trends continue.

Chapter 11—Clean Energy from Here to Eternity

LIKE ALBERT EINSTEIN TALKING ABOUT THE ATOM BOMB, Rachel Carson also told us that the fate of all life on Earth is in the hands of man, and so it is. In 1962, Rachel Carson wrote that, “only within the moment of time... [of] the present century has one species—man—acquired significant power to alter the nature of the world.” Putting aside nuclear war, among the multitude of other ways that humanity is threatening life on the Earth, climate change now is clearly at the top of the list. Our planet has begun a new epoch of geologic time, the “Anthropocene,” an invented word now gaining scientific acceptance as the name for the new epoch.¹

The Anthropocene epoch began either with the Industrial Revolution, or certainly by the second half of the 20th century when it had become clear that humanity is now the force of nature with the biggest impact on our planet. If in the future the air temperature rises by four or five degrees Celsius, if CO₂ exceeds 1,000 ppm, and all of Earth’s ice melts—the sea level will rise by at least 220 feet. There is uncertainty about the timing, but this could happen perhaps during the 23rd century or earlier. Either then or soon to follow is the worst-case scenario, extinction of most life on Earth, as the anoxic ocean first destroys marine life and then emits hydrogen sulfide that could completely poison the atmosphere. The longer humanity continues business as usual, burning fossil fuels and emitting other climate-damaging air pollutants, the sooner and more likely is this fate.

In the short term for behaviors that can no longer be tolerated, achieving reform can be painful. Defeating fascism by 1945 required a U.S. big government’s national mobilization and a global alliance of nations.² To stop slavery in America by 1865 required a bloody Civil War. Stopping business as usual that is

destroying the climate will not require a war, but it is being and will be opposed by the rich and powerful owners of obsolete technologies that threaten life on Earth.

Humanity is now at tipping point where a 19th-century poem (that is also a Protestant hymn) is timely:

Once to ev'ry man and nation
Comes the moment to decide,
In the strife of truth and falsehood,
For the good or evil side;
Some great cause, some great decision,
Off'ring each the bloom or blight,
And the choice goes by forever
'Twixt that darkness and that light.³

To make the right choice sooner rather than later, consider the tools of environmental protection that will save us. They are already here, all around us, floating like life rings or rafts—we just have to just grab onto them. The U.S. Environmental Protection Agency created and used these tools to clean up abandoned toxic-waste dumps, protect the stratospheric ozone sun shield, stop acid rain killing forests and lakes, take the lead out of gasoline, and reduce many forms of water and air pollution. The U.S. was not alone among nations taking effective action, and many of these problems also have been addressed globally with environmental treaties.

We have two old, familiar, toolboxes, both tried and true. One toolbox is labeled “adaptation,” and the other is “mitigation,” or “decarbonization.” First, consider the toolbox “adaptation,” meaning to strengthen our defenses, build “resilience,” and to buy time. We all know that since medieval times the people of the Netherlands have been adapting to the sea. Now they have built enormous berms and water gates, some each as wide as the Eiffel Tower is tall. Dutch adaptation includes enormous pumps to remove seawater, powered by rows of giant wind turbines often standing in the sea. Generating electricity to remove seawater

flooding the land, these devices do the same work as did their medieval windmills turning mechanical lifts. After Superstorm Sandy in 2012, Dutch experts came to consult and to help redesign the entrance to New York Harbor. They produced design drawings of a five-mile-wide water barrier from Sandy Hook in New Jersey to Rockaway on Long Island. While it would cost about \$30 billion, this is only about one-third of the cost of the storm damage in 2012. But since then, there have been no steps toward its construction, even though everyone knows that New York City and its coastal region will flood again soon enough. And the next time the cause may be a landfalling hurricane, not merely a landfalling tropical storm like Sandy.

But for New York City and everywhere it will not be enough to construct adaptive defenses such as water gates. The harsh reality is that mitigation is essential. Mitigation may include both preventing the emission of greenhouse gases (GHGs), and retrieving or recapturing carbon already in the air and “locking it away” by sequestration in plants (including kelp in the sea and forests on land), soil, and deep underground. Sequestration is a little toolbox that holds some promise, and new technologies are being discovered. But sequestration alone will not remove large enough volumes in the time we have left. Without preventing new emissions of GHGs, both adaptation and sequestration in coming decades and certainly in the next century will prove to be futile as putting a Band-Aid on a cancer without treating the disease. They will be as futile as rearranging the deck chairs on the *Titanic* without also changing the ship’s course safely to the south. After Superstorm Sandy, we saw on the New Jersey shore that a roller-coaster had fallen into the sea. It should be clear by now that our carbon-fueled “fun ride” has ended and cannot be restored with Band-Aids and other half measures. Without stopping new emissions, we will suffer more unplanned coastal destruction and abandonment. So now let us put aside both adaptation and sequestration.

Let us move on to consider the essential climate “mitigation” technologies that stop pumping carbon and other GHGs into the air. Among these technologies are new “fun rides,” most being electric cars with rechargeable batteries. (Of course, these cars are only so clean as the fuel used in each power plant making electricity to charge the cars’ batteries.) Hydrogen fuel is an alternative being piloted in demonstration buses first made in Europe that operate on hydrogen fuel cells. The first hydrogen-powered production car—the 2016 “Mirai” (“future” in Japanese)—was made by Toyota, famous for the Prius. Totally clean, a hydrogen vehicle’s only exhaust is water mist or drops of water. Germany and China are building the first “wind-to-hydrogen” plants in the world using wind turbines to make electricity to electrolytically split H₂O—water—into oxygen and hydrogen. Hydrogen fuel made with renewable energy will support 100-percent combustion-free transport from fuel production to its consumption on the road. Norway, France, U.K., India, China, and other nations seeing the future are incentivizing clean-energy vehicles and have goals soon to limit numbers or make it illegal to buy a new gasoline or diesel-powered car.

In 1973 and 1974, the Organization of Arab Oil Exporting Countries (OPEC) embargoed oil shipments to nations that had supported Israel after the surprise attack by Egypt and Syria in the Yom Kippur War. Americans of a certain age will remember standing in long lines at gasoline stations, sometimes unable to buy gasoline even at a very high price. The people of Sweden and Denmark were also standing in lines at gas stations during OPEC oil shock. But they were not asleep. The Danes realized that 94 percent of their fuel was imported oil, and decided that gasoline was an addiction. Without any then-known domestic source of fossil fuels to subvert their government’s plans, the Danes freely chose to develop renewable energy sources. They imposed the first carbon tax, and it funded generous national government subsidies to transition to renewable energy. The Danish company Vestas began to make modern wind turbines, and today it is a

global leader with manufacturing plants in Germany, India, Italy, Romania, the United Kingdom, Spain, Sweden, Norway, Australia, China, and the United States. With less than six million people, tiny Denmark brings in huge amounts of money and creates many good jobs making many of the best wind turbines in the world. Danish carbon pollution has been cut by more than half.⁴

Vestas is only one reason that the Danes (like neighboring Nordic nations) regularly are rated among or at the top of the list of the happiest people in the world. Denmark and Germany were among the first to discover that solar energy works very well even in rather cloudy, cold weather. Solar energy also has been incentivized and is installed in many of the right places. But energy sourced from the wind and the sun are not constant, and their intermittency raises a most important question: on cold nights with no wind blowing, how can the world best make climate-friendly baseload electricity? How can the world be like Sweden, where 100 percent of its electricity is generated by a combination of hydro, wind, sun—and nuclear? Putting aside geothermal and water power that in some places can be helpful locally, for most of the world there is only one power source that is not intermittent—new “fourth-generation” nuclear reactors of advanced design.

These will not be the conventional, “light-water” nuclear reactors that were conceptualized starting during World War II. These primitive reactors were commercialized to make electricity starting in the 1960s, in part because some also produced material for nuclear weapons. After WWII, the U.S. at the same time also developed—but then mostly ignored—advanced-design reactors. These cannot melt down, and they can be made much more proliferation-resistant than conventional reactors. Another advantage is that the advanced reactors will consume as fuel much of the radioactive waste stockpiled at today’s aging, primitive nuclear-power plants.

After WWII, the Argonne National Lab developed the advanced design of the integral fast reactor (IFR), built a prototype IFR power plant that operated at Idaho National Lab successfully from 1964 to 1994, and the Department of Energy (DOE) built a second prototype in the 1980s. So in the U.S. it was a presidential debacle in the mid-1990s to abandon DOE's advanced nuclear-power reactors. Mismanagement has continued since by trying to bury in deep geologic disposal the waste from today's power plants that can fuel advanced reactors.⁵ Now the flood of climate-damaging, cheap natural gas is undercutting climate-friendly nuclear power. The U.S. government is compounding the tragedy by doing nothing as even existing nuclear plants shut too early, while no new and advanced nuclear plants are being built in the U.S.

This ongoing official ignorance and blundering reflects public hysteria arising from the power-plant incident at Three Mile Island (Pennsylvania) in 1979, and the disasters at Chernobyl (formerly within the USSR, today within the north of Ukraine near Belarus) in 1986 and at Fukushima (Japan) in 2011. Yet in the public mind in the U.S., Japan, and Germany, and probably the minds of many politicians, these conventional plants have been confused with and have unfairly tainted the advanced designs that are quite different, being more efficient and much safer. Some internationally active environmental groups have been totally confused and to this day are spreading fear about nuclear power. In fact, it is impossible for even a conventional nuclear reactor to explode like a bomb or a nuclear weapon.

From the accident at Three Mile Island there was no radiation leakage or death. The Fukushima nuclear plant in 2011 embodied the risks in old-design, conventional reactors, but disaster came only for being sited too low to the sea. With only a 19-foot seawall protecting the power plant, it and the town were hit by tsunami at least twice as high. Here is the human death toll:

- 18,000 in town killed in a natural disaster caused by an earthquake under the sea
- Perhaps 1,000 killed in the frantic and botched evacuation
- More than 10,000 killed since by air pollution from coal burning after Japan's panicked response that was to replace all nuclear with coal plants
- 0—zero—killed in a nuclear-power industrial accident

The conclusion: "Radiation rarely kills anyone, but fear of radiation kills a lot of people."⁶

At Chernobyl in 1986, operator errors caused a steam explosion and fire, made worse by the shocking absence of a containment vessel, and radiation did kill many responding workers (47 by the official count). Deaths in the general population were increased by the Soviet government's secrecy, so that lifesaving iodine pills were not quickly distributed before radiation spread over a wide area. It is certainly good that the area around Chernobyl was evacuated, and studies by the World Health Organization and International Atomic Energy Agency have shown that radiation deaths would be "very difficult to detect" among the dispersed and general population. They can only estimate that radiation-caused cancer someday may—or may not—kill up to "several thousand" people. Radiation levels have declined greatly in 30 years; and today the evacuated zone is a very healthy, natural ecosystem.⁷

Nuclear-power opponents should consider that since the 1960s even the commercialized, primitive reactors have caused far fewer deaths and environmental harms than the many foul and varied impacts of burning coal. Air pollution (especially sulfur, heavy elemental metals, and particulates) from coal plants causes emphysema and cancer that kill at least 13,000 people per year just in the U.S. Global estimates range from one to three million people each year killed by coal, disproportionately children. Even much more radiation is emitted by coal-burning

plants than from nuclear reactors operating normally without smokestacks that cause no air pollution of any kind. Many coal miners also die each year, but it seems that in the U.S. no worker has ever been killed by the nuclear elements of a nuclear power reactor. To date, of all sources of power, world history and many studies show—without even considering the climate destruction coal causes—that coal is by far the most deadly source of energy, and even conventional or primitive nuclear plants are definitely the safest. France and Sweden understood early this benefit of nuclear power, and today a growing number of nations agree.

An open question is, will the advanced nuclear reactors invented in the U.S. be “made in USA”? Not if we maintain our irrational fears about nuclear power, and not unless we wake up. Our continued ignorance and mismanagement may cause another major industry to be lost to other countries with governments capable of perfecting and bringing advanced designs online. Russia today leads the world in supplying turnkey nuclear plants to many nations, and it is perfecting its advanced designs. South Korea may be joining in this trade. As with cell phones, laptops, flat-screen TVs, and solar panels, the Chinese are taking steps to be able in coming decades to manufacture and export advanced nuclear reactors to the waiting world. Without the cost overruns of constructing massive reactors on a distant site, these Chinese exports likely will be small modular reactors (SMRs), made in shipyards, and exported widely in China’s “Belt and Road Initiative.” Anywhere in the world, the customer will just line up and connect one, two, or however many little reactors are needed, and then plug them in to the electric grid. For use in the U.S., when the wind is not turning the blades for our turbines bought from Vestas, or the sun is not shining on our imported Chinese solar panels, soon safe and cheap SMRs imported from China will be available. To buy them, the U.S. will increase our debt or send ever more of our dollars to China, while too many of our citizens lack manufacturing jobs.

The public-health, economic, and geophysical bottom lines are this: Coal, all fossil fuels, and their resulting climate change are far more life-threatening than the advanced nuclear power that can stop climate change. So today it is urgent that the U.S. DOE reopen the program that President Clinton killed, and generously fund the development of advanced designs such as the IFR and molten-salt reactor. As quickly as possible, advanced reactors should be licensed for mass production or for construction on site under strict supervision to prevent outrageous cost-overruns. In particular, DOE in collaboration with the Department of Defense should place an initial order of about 50 SMRs perhaps first to be installed at U.S. military bases, a number large enough to make it worthwhile to build the plant to mass-produce them. Unlike the reactors at Fukushima and at many existing sites operating conventional reactors, the new reactors should be installed only above where the sea too soon will be flooding, whether from the tidal waves that at times may be caused by earthquakes or worsening hurricanes, or by sea-level rise coming during the century or more that a reactor may operate. And no more U.S. reactors ever again should be placed on earthquake fault lines. Done correctly, this infrastructure program is key to human survival on this planet.



Let us turn now from overviewing our technological tools of GHG mitigation to our tools of social policy that can bring effective mitigation into life. Many economists and experts agree that—as we saw happen in Denmark and now is happening in countries going greener like China—of course we can enjoy both a strong economy and a clean environment. It is not a choice of one or other, the economy and the environment are not enemies, and both can rise together. It is not “bad economics” to end the fossil-fuel business. Instead, it is devastatingly bad economics not to realize that “the economy is a wholly-owned subsidiary of the

environment,"⁸ and not to see that the benefits of acting now far exceed the costs of waiting for the enormous disaster coming soon enough if we continue to wander down our present path.

Most economists also take the correct and conservative position that the switch to renewable energy can be done more efficiently not by governments, but by profitable private business enterprises. As we have seen with the uptake of modern TVs and electronic personal devices, progress can be very rapid when private profits are big. Two key questions are these: Who can correct the free market's disastrous failure to bring in climate-friendly energy sources fast enough, even though the social benefits are great beyond measure? By what new social policies or rules can we create big profit incentives for businesses so that reform comes quickly? The answer to both questions is that national governments must write new marketplace rules to make reform very profitable for businesses.

It helps to remember some simple, rather recent examples. Consider airbags and seat belts. Starting in the 1970s, many national governments used command-and-control to require that all new cars have these safety devices. The law applied also to imported cars, so no domestic auto maker would be undersold by non-complying imports. Only new cars were regulated, so there was no required retrofitting, and old, relatively unsafe cars could be used until scrapped. As a result, more cars have been sold than ever. Today in the U.S. with more than twice as many cars on the road, half as many people die in auto wrecks as they did 40 years ago when cars were not so safe. Social benefits far exceed incremental costs.

The rules requiring these upgrades in new cars are a familiar example of basic "command-and-control," or "do-it-or-else," traditional regulation. Such regulation began long ago, when sleepy citizens of medieval towns were prohibited from throwing their night soil and urine out the window into the street (yet we still allow massive industries to throw their waste CO₂ up into

the air). Starting in the 1970s, polluting factories and power plants have been required to get permits to pollute (allowed only up to levels that EPA scientists deem tolerable). The total number of permits to pollute can be “capped” or limited where necessary not to overload the environment. Like driving a car without license, it can be a criminal offense to operate without a pollution permit after the date required to get one. (Of course, some activities, like toxic-waste dumping, are so horrific that they can only be banned, and after the effective date of a command-and-control ban any intentional violation will be criminal.)

It has been said that “if the only tool you have is a hammer, then every problem is a nail to be pounded.” But every problem is not a “nail” requiring the hammer of command-and-control regulation. Many problems can be fixed with tape or glue and without pounding with a hammer. And so it was that a conservative, “free-market” think tank during the 1970s conceptualized a new type of regulation called “cap-and-trade.” Polluters liked it—at least compared to traditional rules, and EPA adopted this private-sector-recommended social policy. To implement the “trade” element of cap-and-trade, starting in the 1980 in the U.S., a very big innovation has been for the EPA to create new free markets for some *tradeable* pollution permits. Like stocks and bonds in securities markets, and even more like grain and cattle futures in the commodities markets, some pollution permits can be bought and sold as commodities under government oversight to ensure market integrity. More than 35 years ago in the 1980s, EPA used capped and tradeable lead permits to facilitate refineries removing from gasoline the lead causing brain-damaged city children. More than 25 years ago in the 1990s, EPA used capped and tradeable permits to reduce air pollution (primarily sulfur) from coal-fired power plants causing acid rain. Today the EU, parts of China, Canada, and a growing number of U.S. states have created starter markets for tradeable carbon-pollution permits. And on January 1, 2013, to protect the

climate, trading of carbon permits began in the world's fifth or sixth largest economy—the State of California.

To protect the climate, the mechanics of a national cap-and-trade decarbonization program would be these: EPA scientists first determine as a starting point the total carbon that can be emitted by all polluting sources in each regulated business sector. At that level, EPA puts a cap or upper limit on the number of carbon permits. Then EPA issues, freely or at a set price or at auction, permits—often called pollution “allowances” or “credits.” To continue to operate lawfully, each source must have enough permits for its amount of pollution. EPA creates and oversees an honest, free market for trading permits issued, a public place for each polluting source to buy and sell the permits it needs to continue to operate. Over time, EPA will gradually reduce the cap (total pollution allowed for the business sector) and correspondingly reduce the total number of allowed permits; these permits may become more expensive as the cap is reduced.

A polluting source that early in the cap-and-trade program has depreciated, dirty equipment needing replacement will quickly switch to clean, non-polluting fuels and technology. Not only will this source not need to buy tradeable permits, it will be rewarded by being able to sell its unneeded, unexpired permits to a source still polluting using dirty fuels and aging technology. To recover some of the capital cost to modernize is a nice reward for being among the first to come “clean”! A polluting source still using old fuels and dirty equipment need not immediately scrap it all, but can buy permits and continue to operate the dirty equipment until it is fully depreciated—or until it becomes too expensive to buy carbon-pollution permits becoming more scarce as EPA shrinks the cap. Over time, as everywhere “dirty” old equipment eventually wears out and must be replaced anyway, as each year passes more sources will switch, each spending its money to modernize instead of buying permits. When the cap falls to zero, all sources still using dirty, old fuels

and equipment must immediately switch to climate-friendly operation.

With a trading market for pollution permits, each factory, refinery, power plant (and whatever may be a polluting source in a regulated business sector) has the time and the freedom to decide for itself when to modernize, and to do so only when it costs less. As we saw with seat belts, airbags, and air-conditioning equipment under the Montreal Protocol, a cap-and-trade program allows existing equipment to wear out until it would need to be replaced anyway. Unfortunately, industries may find that their climate-change denial and obstruction over the last few decades have squandered years that could have made possible such a gradual and easy way to reform. With so little time now to save the climate from dirty fuels and equipment with a long life span, EPA may have to more quickly reduce the cap to force early retrofitting or replacement before old equipment is fully depreciated.

With climate change now taking on the aspect of a global emergency, attention is turning to another old tool that also is not a command-and-control hammer, but may be faster and simpler to administer than cap-and-trade. More than 100 years ago, the British economist Arthur Pigou wrote that social cost should be “internalized” in product pricing by a so-called “sin tax” on each troublesome product sold. These avoidable taxes send price signals to buyers either (1) to select another product instead that is cheaper (being tax-free) and cleaner (or without sin), or (2) when buying a troublesome product to pay the sin tax to cover the damages that the product will “externalize” or cast off onto society or the environment. In the EU, they call this “The Polluter Pays Principle.” If using taxes to send price signals in the marketplace sounds radical, consider that many, indeed most, U.S. states use “sin taxes” to raise revenue while suppressing troublesome products that remain mostly tolerable with necessary state oversight. States happily tax cigarettes, liquor,

state lotteries, and most recently marijuana. Environmental “sin taxes” familiar to all Americans include town or municipal charges for sewer (and the clean water that humans turn into sewage) and the fee at the landfill to take what the garbage truck will not accept from your curbside. To repurpose and apply this familiar, same old public-policy tool to climate mitigation will not in any way be radical.

Very recently, this trusty old tool has been applied to reduce to throw-away, blow-away, flimsy plastic market-shopping bags. While they are banned outright in some progressive places like California, New York State, and France, a softer approach is to tax this offending product. Today Britain, Denmark, Hong Kong, and South Africa are among many nations that require retailers to collect a small tax or fee on each throw-away bag. In the U.S., some states and cities are also requiring this. Smart shoppers are happy to switch to reusable cloth market bags, now available everywhere and often given away to the public. Only shoppers who still want the nuisance bags pay the blow-away-bag tax. Each shopper has a market choice, freely made. The European Polluter Pays Principle—the full-cost “internalization” principle—is also applied in the “Green Dot” program described in the previous chapter on Germany. Here the “sin tax” takes the form of the small licensing fee included in the retail price of each container, packaging, and product marked with the “Green Dot” logo and covered by the Extended Producer Responsibility program. The collected fees are used to fund private waste management that recycles twice as much as public authorities, upon whom can no longer be offloaded or “externalized” the cost of waste management.

Let us move on from blow-away bags and consider sin taxation regarding a runaway climate. Lacking a sin tax to support the U.S. Federal Emergency Management Agency, in 2012 FEMA already was in great debt in 2012 when Superstorm Sandy devastated New York and New Jersey. To pay for Sandy’s

cost, Congress with a federal “bailout” borrowed about \$60 billion, mostly from China, and U.S. taxpayers must pay this back. Since 2012, up and down the East and Gulf Coasts there have been major floods, caused by “rain bombs” from “atmospheric rivers” —three days of heavy rain in air flowing in from above the warmer sea. These floods have sunk FEMA further into debt, and in the future it will be worse. But as of 2019, the U.S. has no financing plan for FEMA other than to borrow more money from China.

Imagine a much better way to fund FEMA fully and in advance—a national “sin tax” on carbon emissions that only the polluter pays. A Pigovian carbon tax, like the Danes and later the Swedes use to help achieve both their great national prosperity and superb environmental management, could fully fund a new “U.S. Climate Security Social Insurance Fund.” With this money, FEMA would be prepared to both respond to storms and to do much more—to plan ahead by funding new public projects of adaptation, abandonment, and relocation to higher ground. Done correctly, this infrastructure program also will have many benefits. If this sounds radical, consider that many, indeed most, U.S. states by law mandate payments into insurance funds for workers’ compensation insurance, unemployment compensation insurance, and automobile insurance for each driver.⁹ Required insurance protects ordinary people from some forms of economic devastation, and these long-standing state programs are in no way controversial. Again, there is nothing new here—a new “U.S. Climate Security Social Insurance Fund” would just be the repurposing of a trusty and proven policy tool to sensibly address a new problem that must be managed at the national level.

In addition to social insurance, an attractive new policy tool might be called “free money”—100 percent tax rebates! The Province of British Columbia in 2008 instituted a popular carbon tax that is rebated 100 percent by reducing other taxes on

payrolls and incomes. British Columbia has the lowest payroll and personal income tax rates in Canada and one of the lowest corporate tax rates in North America. Gross domestic product (GDP)—the economy—is up and climate-changing pollution is down compared to the rest of Canada. In 2019, Canada imposed a nationwide carbon tax on fossil fuels and industries emitting carbon. The Canadian government expects from the tax money to rebate more cash benefits to the average household than it paid as carbon tax.

Recently in the U.S., some well-known, even famous leaders and economists¹⁰ calling themselves “The Climate Leadership Council” have proposed a national “Carbon Tax and Dividend” that would be 100 percent rebated to the people. In the “Conservative Case for Carbon Dividends,” these statesmen proposed a “...new climate strategy [a carbon tax, rebated—with revenue neutrality, that] can strengthen our economy, reduce regulation, help working-class Americans, shrink government, and promote national security.” By making fossil fuels comparatively more expensive, with rebated “free money” for consumers to spend in the marketplace, the advantage of these plans is doubled. A fully rebated carbon tax will drive down fossil-fuel use at the same time it that stimulates the uptake of electric or hydrogen vehicles and clean electrical power. To “tax the bads to free the goods” is beautifully conservative, and in no way radical or socialistic.

In a world of globalized trade, to prevent competitive disadvantage, a climate-friendly nation will impose its carbon fee or tax on imported, carbon-intensive goods—and on all goods it imports from a foreign nation not having a carbon tax or a comparable climate-saving regime. A climate-friendly nation also will protect its exports from competitive disadvantage. For goods being shipped to a foreign nation where a carbon tax is imposed on these imports, the exporting nation will refund its internal carbon tax so that it is not paid twice. The device of a tax refund

on exports is already familiar to many American tourists who routinely receive a refund of the European value-added tax (VAT) when returning home with consumer goods bought in Europe. A scheme of such carefully crafted border adjustments to the carbon fee or tax, affecting both imports and exports, is the starting point to protect climate-friendly nations from unfair competition in trade with climate-damaging nations. When the slumbering World Trade Organization awakens to the existential threat of climate change, the WTO will create such a globally harmonized regime for all member nations, and it will allow and better yet will require national trade sanctions upon nations that are not climate-friendly. Then international trade will proceed with little confusion and maximized climate protection.



With all tools of technology and policy in hand, when enough people decide to keep the fossil fuels in the ground, we will live under national climate-protection laws required by an effective treaty. Parties to the treaty will be reciprocally obligated by international law to enact national laws to reduce greenhouse-gas emissions, to employ pollution fighters to combat GHG-tax evasion and fraud in trading GHG permits, to self-report to the U.N., and to consent to U.N. monitoring and inspections. Governments that do not join the treaty or that fail to meet its obligations will violate international law and be subject to escalating trade sanctions, restrictions, and bans. This is not new or complicated. As children in elementary school, we were all told to play nicely with other children and to stay away from a mean child who plays dirty. Our teacher would keep the nasty bully inside during recess. As adults on a global economic playground or sports field, our shared international goal is that there be fun products and happiness (profits) for all, and that there be fair competition on a field that is green and level.

Nations that are dirty players will be benched and removed from the game.

These government-against-government trade sanctions are tried and true as the familiar enforcement mechanism of treaties. The U.N. and World Trade Organization (WTO) already use sanctions to control the global economic playground so that nations that do not fairly trade the goods they produce—hats, shoes, cars, and whatever—have to sit in the penalty box, isolated until they will play fairly. An effective climate-change treaty, like many other treaties already do, will do this and more so that climate-friendly nations can close their borders to climate-destroying nations. The rogue nations hurting the climate—the bullies—will enjoy no international trade, no international banking, no landing of their airplanes or ships in ports abroad, no visas for their citizens to visit or work abroad, and no visiting tourists bringing in hard money from climate-friendly countries. In recent years, we have all seen a variation of such sanctions placed on Iraq, Iran, North Korea, and Russia. These sanctions have been to encourage self-control and disarmament for chemical and nuclear weapons, and to punish Russia for invading and seizing parts of Ukraine. When the world realizes that climate chaos will be at least as damaging as military invasion and the misuse of weapons of genocide and mass destruction, these familiar policy tools will be made available in a new treaty strong enough for real climate protection.



Our planet is losing its life, our climate is crashing, and since 2017 our President has deconstructed our Environmental Protection Agency. Considering the dire situation we face, and how my generation has failed to rise to the challenge, nevertheless I do see reasons for hope. Devastating sea-level rise by at least five to ten feet will likely happen sometime in this

century, and in the 22nd century it is inevitable that the sea will rise much, much more. We can hope that this disastrous inundation will happen at least a century before the oceans and then the air become deadly poisonous with hydrogen sulfide. While my generation still does too little, younger generations, who are more thoughtful and alert now see this danger and are marching in demonstrations for immediate action. Within a few decades, all of our grandchildren, then in adulthood, will see our port cities start to go permanently under ocean waves, and too many will find themselves living in or near routinely flooding or post-apocalyptic ruined homes. Wading in the problem, no longer will the threat be distant and deniable. Though the climate will be terrible, we can hope that our descendants will have at least another century, just enough time to prevent CO₂ from rising to 1,000 ppm, the threshold for human extinction. This will be the last chance for them and their grandchildren to act in time to stop more climate pollution, just before human extinction becomes real.

My generation's culture of "meritocracy" has become individualistic to the point of self-centeredness, consumerist to the point of excess, and capitalist to the point of domination and expropriation. Struggling amid social upheaval and in deprivation among the drowned and crumbling remnants of materialism, some among future generations will slip into thievery and villainy. Still I see hope too that this culture will change in our descendants, as we see in today's neighbors and responders after tornadoes and other natural disasters, when only a few steal what they can find in the ruins. Most people even when suffering themselves will not take from others, but will give of themselves to help others. When feeling that "we are all in this together," at least in most people a sense of community will replace self-centered individualism, and contributing often replaces taking.¹¹ Europeans call this "solidarity," a shared mindset united in helpful action. And as the Danes and other Nordics have long known from daily living in this way, more

people feel happy even with less—in the case of the Nordics, with less after-tax income and little or no sun during some of nature’s toughest winters. And let us be uplifted by the memory of Sister Euthymia of Münster, Germany, who—by giving her stunted life to the service of others—found bliss.

I expect that future generations, forced in hard times to labor communally to do right by nature and by each other, will uplift themselves and experience a spiritual reawakening of the soul. Though reduced in numbers, humanity will be better for having suffered. With remaining natural resources diminished to the point of scarcity, there will be a great need to preserve what remains and to prevent damage to the usable environment. Almost every person, in one way or another, will become a pollution fighter. The USEPA and UNEP will not remain puny and insufficient to the task. In far greater numbers, a larger proportion of society will come to do the work of fighting pollution, while feeling the same intense satisfaction that I enjoyed in my career in environmental protection.

We cannot roll back the clock to the reset the climate. Yet the very good news is that right now humanity has all the tools, both of technology and social policy or law, to very quickly stop more climate pollution. Today we lack only the necessary mass fear and popular will to reform our economy and to save our posterity. We can hope for the best, but we are long past overdue to prepare for worst, and I suspect that my generation of self-centered “meritocracy” may continue to fail humanity. By continuing to follow the same path ending in a disaster of our own making, many of today’s grandparents, especially our doing-nothing leaders, are on track to be scorned in memory and history like Nero who fiddled while Rome burned. Whether—and when—today’s older generations and leaders will ever wake up to act decisively, effectively, and globally, will shape the memory of us and the planet that we will be leaving for our grandchildren to inherit.



To my young readers who have traveled this far with me, a final message: I do hope that my thesis has come through that you too can find great satisfaction in being environmental activists. Let my ending be your beginning. In this book I have tried to model for you the planet-protecting power of a law degree, as just one of the keys to a career that can help save our life on Earth. Many of you will be needed in many professions needed for pollution control and natural-resource conservation, yet perhaps more of you will be needed as engineers in the private sector. You will build in safe places the new, clean-energy equipment to mitigate the collapse of the climate. You will build—often relocated to safer ground—the civil infrastructure and private properties that will survive the harsh new environment. If you are about to enter a university, consider studying for a growing number of occupations where you can find real happiness and paychecks as full-time professionals working to save our planet.

At the same time, speak with and try to “wake up” your parents and grandparents so that they will better understand and support your goals. Ask them to read books like mine that credibly model the feasibility of a “green” professional career. Don’t hesitate to join a climate march, and do invite your older family members to join you in the protest. They should remember how the marches of their youth helped to gain better rights for women, African Americans, and other minorities, and to end the U.S. government’s unnecessary and tragic war in Vietnam. I hope that your older family members will come to share your passion and agree that getting the necessary education is worth the family or personal expense and the effort. For *your* grandchildren to follow, saving the planet will be the great mission of your time. You can do it, and I wish you well.

1. “Anthropocene” as a new term was created by Paul Crutzen, the Dutch scientist among those awarded the Nobel Prize for discovering the threat to the stratospheric ozone sun shield.

2. For a view of this future, read *The Collapse of Western Civilization: A View from the Future*, by Naomi Oreskes and Erik M. Conway (Columbia University Press, 2014). They foresee vast social disruption as all coastal habitats, including many of our most important cities, are abandoned, and all people and infrastructure must be relocated to upland areas inland. To attempt to handle the chaos, the authors predict that the U.S. necessarily will experience a big-government mobilization exceeding that of World War II. They also predict the collapse of free-market capitalism, not because it created the fossil-fuel menace, but because it has prevented our democratic government from acting in the 20th century and even now after the danger has become scientifically certain. See also *This Changes Everything: Capitalism vs. the Climate*, by Naomi Klein (Simon & Schuster, 2015).

3. “Once to Every Man and Nation” was written by James Russell Lowell of Boston in 1845. It was composed in opposition to the U.S. invasion of Mexico, and it was sung also by Americans who would abolish slavery. This poem is apt for any crucial turning point requiring that the right choice be made.

4. *The Almost Nearly Perfect People: The Truth About the Nordic Miracle*, by Michael Booth (Jonathan Cape, 2014). Yes, taxes are very high in most Nordic countries. But the payback is huge—assured health care and day care, educational opportunity, upward social and economic mobility, thriving free-enterprise, low inequality, strong social cohesion (high levels of trust), little corruption, and low crime rates. With some of the darkest and coldest winters, Nordics may not be joyful each day, but they are rarely miserable and usually well satisfied. A Nordic nation is almost always rated as the “happiest” in the world.

Capital in the Twenty-First Century, by Thomas Piketty (Harvard University Press, 2014) states that the real story of today’s global capitalism is that, far beyond the right amount of economic inequality, it is concentrating wealth and income to the point of social dissatisfaction and instability. Without such enormous economic

polarization, Nordic nations stand in sharp contrast to many other nations, whose 26 plutocrats have the same wealth as the bottom half (\$3.85 billion) people of the world, and in the U.S. the top three wealthiest men possess wealth equal to the entire bottom half of the U.S. population. Yet in many capitalist nations following the social mobilization of WWII, from 1945 to about 1975 there was a brief time when gross inequality declined. This was particularly true in Anglo-American countries including Canada that briefly had very progressive national tax systems. Even despite to the social turmoil of the 1960s and Vietnam War, for Americans these were mostly happy and productive years with increasing paychecks for average workers and compensation for CEOs that was not exorbitant.

5. *The Power to Save the World: The Truth About Nuclear Energy*, by Gwyneth Cravens (Penguin Random House 2017, Knopf 2007); *Prescription for the Planet*, by Tom Blees (Amazon's Booksurge Company, 2008) www.prescriptionfortheplanet.com; *Beyond Fossil Fools*, by Jos. M. Shuster (Beaver's Pond Press, 2008); *Plentiful Energy: The Story of the Integral Fast Reactor*, by Charles E. Till and Yoon Il Chang (Amazon's Create Space Company, 2011).

6. *A Bright Future: How Some Countries Have Solved Climate Change and the Rest Can Follow*, page 91, by Joshua S. Goldstein and Staffan A. Qvist (PublicAffairs, 2018).

7. *Ibid.*, page 92.

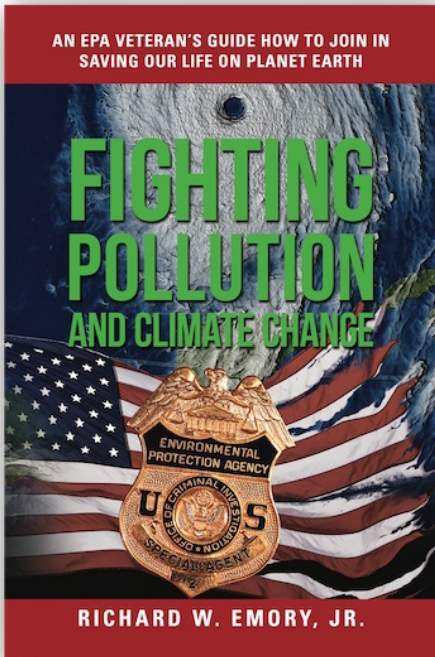
8. This memorable line has been attributed to Senator Gaylord Nelson and to former Senator Timothy Wirth when he was at the State Department. *Apollo's Fire: Igniting America's Clean-Energy Economy*, by Jay Inslee and Bracken Hendricks (Island Press, 2009; *Unstoppable: Harnessing Science to Change the World*, by Bill Nye, "The Science Guy" (St. Martin's Press/Macmillan, 2015).

9. Other U.S. examples of mandated social insurance are national—Social Security, Medicare, and Medicaid. The Europeans and Canadians are among the highly civilized people who have long since accomplished universal health care for all as a right of citizenship or just of common humanity. But in the U.S., "the land of the free and the home of the brave," the availability of universal health care

("Obamacare," enacted in 2010) has been under constant attack in Congress, the federal courts, and national political debate.

10. James A. Baker III, Martin Feldstein, Ted Halstead, N. Gregory Mankiw, Henry M. Paulson, Jr., George P. Schulz, Thomas Stephenson, and Rob Walton are among the first prominent Americans to promote this. The list has been growing steadily. According to the *New York Times* (1/20/19), on January 17, 2019, "The last four people to lead the Federal Reserve, 15 former leaders of the White House Council of Economic Advisers, and 27 Nobel Laureates signed a letter endorsing a gradually rising carbon tax whose proceeds would be distributed to consumers as "carbon dividends." These leaders are among the many economists who would "internalize"—include in product pricing—the social and environmental costs that capitalism without adequate regulation will naturally offload or "externalize" as burdens on society and the environment. In the U.S., a grassroots and effective group calling itself the "Citizens' Climate Lobby" now is focused on achieving a national "carbon fee and dividend" law.

11. *The Second Mountain*, by David Brooks (Random House, 2019).



This book by an EPA insider reviews the history, science, and law of pollution control. It displays the tools available now to control man-made climate change. It inspires concerned citizens, especially younger people who will inherit a dangerous planet, to join in saving our life on Earth.

Fighting Pollution and Climate Change
An EPA Veteran's Guide
How to Join in Saving Our Life on Planet Earth
by Richard W. Emory, Jr.

Order the complete book from the publisher [Booklocker.com](https://www.booklocker.com)

<https://www.booklocker.com/p/books/10724.html?s=pdf>

or from your favorite neighborhood
or online bookstore.