

CHAPTER 1

EARLY ENVIRONMENTAL HISTORY (1)

INTRODUCTION

BANG! The Big Bang. In 1948 physicist G. Gamow proposed the big bang theory of the origin of the universe. He believed that the universe was created in a gigantic explosion as all mass and energy were created in an instant of time. Estimates on the age of the universe at the present time range between 7 and 20 billion years, and with 13.5 billion years often mentioned as the age of the planet Earth.

The bang occurred in a split second and within a minute the universe was approximately a trillion miles wide and expanding at an unbelievable rate. Several minutes later all the matter known to humanity had been produced. The universe as it is known today was in place.

Gamow further believed that the various elements observed today were produced within the first few minutes after the big bang, when near infinitely high temperatures fused subatomic particles into the chemical elements that now comprise the universe. More recent studies suggest that hydrogen and helium would have been the primary products of the big bang, with heavier elements being produced later within stars. The extremely high density within the primeval atom caused the universe to expand rapidly. As it expanded, the hydrogen and helium cooled and condensed into stars and galaxies. This perhaps explains the expansion of the universe and the physical basis of Earth.

Flash forward to the present. More than any other time in history, the 21st century will be a turning point for human civilization. Human beings may be facing ecological disasters that could affect their ability to survive. These crises could force them to reexamine the value system that has governed their lives for the past two million years of existence (2). At some point during its journey human society lost its feeling of connectedness to nature, resulting in a “we can manage the world” attitude. This attitude might ultimately lead to the destruction of this country and the world.

How did it come to this? The answer lies in a knowledge of human history, a surprisingly brief chapter in the chronicle of the planet—how brief can be demonstrated by the use of a standard calendar to mark the passage of time on earth. The origin of the earth, estimated to be some several billion years ago, is placed at midnight January 1, 2007 and the present at midnight December 31, 2007. Each calendar day represents approximately 12 million years of actual history. Using this time scheme, dinosaurs arrived about December 10 and disappeared on Christmas day. The first humans can be placed at 11:45 P.M. on December 31. The recorded history of human achievement takes up only the last minutes of the world (2).

The remainder of this chapter describes the path that led to this dangerous predicament. However, this path is now leading a growing number of individuals to unite in a broad social movement called environmentalism: a movement that is building a potential road out of this predicament.

THE FIRST HUMANS

Environmental problems have bedeviled humanity since the first person discovered fire. The earliest humans appear to have inhabited a variety of locales within a tropical and semitropical belt stretching from Ethiopia to southern Africa about 1.9 million years ago. These first humans provided for themselves by a combination of gathering food and hunting animals. Humans, for the majority of their two million years' existence, lived in this manner. The steady development and dispersion of these early humans was largely due to an increase in their brain size. This led to the ability to think abstractly, which was vital in the development of technology and ability to speak. This in turn led to cooperation and more elaborate social organization (3). The ability to use and communicate the developed technology to overcome the hostile environment ultimately led to the expansion of these first human settlements.

With the use of primitive tools and skins of animals for clothes, the first humans moved outside Africa about one and a half million years ago. The migration led them into the frostfree zones of the Middle East, India, southern China and parts of Indonesia. The humans at this time could only adapt to those ecosystems found in the semitropical areas that contained a wide variety of vegetation and small, easily hunted animals to supplement their diet. Despite relatively easy access, Europe was not settled for a long period of time due to the deficient ecosystem, which was later overcome by an increase in technology. The first evidence of human settlement in Europe is dated to about 730,000 years ago. The settlement

of America was almost the last stage in the movement of humans across the globe about 20,000 years ago. This was made possible by crossing to Alaska in the last glaciation when the reduced sea levels turned the Bering Strait into a land bridge. Once the first human settlers were able to move south through the passes, they found an enormously rich environment that supplied plenty of food. The human population multiplied rapidly and within a few thousand years had spread to the tip of South America.

By about 10,000 years ago humans had spread over every continent, living in small mobile groups. A minority of these groups lived in close harmony with the environment and did minimal damage. Evidence has been found where groups tried to conserve resources in an attempt to maintain subsistence for long periods of time. In some cases totemic restrictions on hunting a particular species at a certain time of the year or only in a certain area every few years helped to maintain population levels of certain animals (4). The Cree in Canada used a form of rotational hunting, only returning to an area after a considerable length of time, which allowed animal populations to recover. But the majority of these groups exploited the environment and the animals inhabiting it. In Colorado, bison were often hunted by stampeding them off a cliff, ending up with about 200 corpses, most of which could not be used. On Hawaii, within a thousand years of human settlement, thirty-nine species of land birds had become extinct (3). In Australia, over the last 100,000 years, 86 percent of the large animals have become extinct. The large numbers of species lost was largely due to the tendency for hunters to concentrate on one species to the exclusion of others. The main reason why these groups avoided further damage to nature was the fact that their numbers were so small that the pressure they exerted on the environment was limited.

THE DEVELOPMENT OF AGRICULTURE

A major shift in human evolution took place between 10,000 and 12,000 years ago. Humans learned how to domesticate animals and cultivate plants and in doing so made a transition from nomadic hunter gatherer to rooted agriculturalist. The global population at this time was about four million people, which was about the maximum that could readily be supported by a gathering and hunting way of life (3). The increasing difficulty in obtaining food is believed to be a major contributor to this sudden change. The farmer changed the landscape of the planet and was far more destructive than the hunter. While farming fostered the rise of cities and civilizations, it also led to practices that denuded the land of its nutrients and water-holding capacity. Great civilizations flourished and then disappeared as once-fertile land, after generations of over-farming and erosion, was transformed into barren wasteland.

The adoption of agriculture, combined with its two major consequences, settled communities and a steadily rising population, placed an increasing strain on the environment. The strain was localized at first, but as agriculture spread so did its effects. Agriculture involved removing the natural habitat to create an artificial

habitat where humans could grow the plants and stock the animals they would need. The natural balance and inherent stability of the original ecosystem were thereby destroyed. Instead of a variety of plants and permanent natural ground cover, a small number of crops made only part-time use of the space available. The soil was exposed to the wind and rain to a far greater extent than before, particularly where fields were left barren for part of the year, leading to a higher rate of soil erosion than under natural ecosystems. Nutrient recycling processes were also disrupted and extra inputs in the form of manures and fertilizers were therefore required if soil fertility was to be maintained. The adoption of irrigation was even more disruptive since it created an environment that was even more artificial. Adding large amounts of water to a poor soil would allow the farmer to grow his preferred crop, but it would have catastrophic long term effects. The extra water would drain into the underlying water table, sometimes leading to rising water levels which caused the soil to become waterlogged. This additional water not only altered the mineral content of the soil but also increased the amount of salt and would eventually—especially in hot areas with high evaporation rates—produce a thick layer of salt on the surface that made agriculture impossible. The emergence of villages and towns meant that the demand for resources was now more concentrated.

These early societies were dependent on the production of a food surplus in order to feed and support the growing number of priests, rulers, bureaucrats, soldiers, and craftsmen. Forests suffered the most as the demand grew for wood to build houses, heat homes and cook. Local deforestation around settled areas added to the increase of soil erosion. Soil erosion then led to badly damaged landscape, declining crop yields and eventually an inability to grow a surplus of food. The first signs of widespread damage emerged in Mesopotamia, the area where the most extensive modifications to the natural environment were first made.

Both domestication of animals and the cultivation of plants had dramatic impacts on the environment. The nomadic hunters and gatherers were aware that they shared the earth with other living things. Animals and humans were able to live in the same area since the hunters and gatherers did not destroy the ecosystem to a great extent. The agriculturalist, on the other hand, deliberately transformed nature in an attempt to simplify the world's ecosystem. As an example, by ploughing and seeding a grassland, a farmer would eliminate a hundred species of native herbs and grasses, which would then be replaced with pure strands of wheat, corn, or alfalfa. This simplification reduced the stability of the ecosystem, making it uninhabitable for most animals.

COLONIZATION OF THE NEW WORLD

Only five hundred years, a mere second on the geological clock, have passed since Columbus' discovery opened a fresh and verdant new world to the Europeans: a land with few indications of human occupation except for a few thin plumes of smoke rising from cooking fires in small clearings in the woods. These clearings belonged

to the Native Americans, which numbered about four million at this time. Over the centuries these people had created their own complex culture. Their means of sustaining themselves did not rely on scarring or subduing the earth, but on using what it offered. Native American society was not separate from nature but part of it. Geography, as well as history, began to change when Christopher Columbus anchored his little fleet off the island of San Salvador. Like most of those who followed, Columbus and his company risked the voyage to the New World for what they could take from it. They came for gold, a trade route to the spices of India and other riches of Asia: land, goods to sell, glory, adventure, religious and personal freedom, and in some cases to convert the heathen to Christianity (5). Although the explorers, adventurers, and settlers came to seize whatever riches and opportunities the land had to offer, it was what they brought with them, far from what they took, that changed the face of the continent forever. What they brought was Europe's two thousand or more years of western history, customs, prejudices and methodology. They brought European technology, philosophy, religion, aesthetics, a market economy and a talent for political organization. They brought European diseases that decimated the native people. They also brought with them European ideas of what the New World was and visions of what it should be.

In the beginning, the explorers and first settlers were faced by a dark forbidding line of forest behind which was a vast, unmapped continent, inhabited, they thought, by savages, and filled with ferocious wild beasts. Mere survival meant conquering the wilderness. The forest had to be cleared to make living space and to provide wood for shelters and fires (5). Behind the trees lurked the Indians, ready, the settlers suspected, to commit unspeakable atrocities. The forest was filled with wolves, bears, and panthers that would pounce on their children and domestic animals, or so they feared. The greater the destruction of the forest, the greater the safety for the tiny communities clinging to the edge of the hostile continent. Removing the trees also opened land for crops and cattle. Killing the wild animals not only filled the pot with meat but eliminated the deer and other grazing animals that stole the settlers' corn (5).

The European population quickly grew beyond the carrying capacity of the land. Cropland was frequently exhausted by permanent cultivation; cattle, swine, and sheep introduced by immigrants made far heavier demands on field and forest than wild animals. As each new field was harvested, the chemical, mineral, and biological nature of the soil itself was depleted. The Europeans also brought technology that contributed to the heavy impact they had on the land. Horses and oxen enabled the settlers to open and cultivate much broader acres. Plows could dig deeply into the soil, exposing far more loam. With draft animals, the Europeans could harvest heavier loads and transport them to markets. Sailing ships could then transport those loads along the coast or across the ocean.

Whereas the Native Americans would take from the land only what they could consume, the colonist and their successors sought to grow surplus that they could sell for cash or trade for manufactured goods and other commodities. The production of surplus led to the accumulation of capital and the creation of wealth, largely in the

towns that served as marketplaces. That meant clearing more land, cutting more timber, planting more crops, and raising more cattle, all at a rate that could be sustained only at a cost of permanent damage to the land. The deforestation of New England and the disappearance of the beaver in the East are but two dramatic examples of how the demands of the market could deplete abundant resources in short order. By the time of the American Revolution, the wilderness along the eastern seaboard had been tamed. While some pockets of forest remained, the thirteen colonies were largely covered with farms, dotted with villages, and punctuated by a few substantial cities, notably Boston, New York, Philadelphia, and Charleston.

THE INDUSTRIAL REVOLUTION

Early in the nineteenth century, an awesome new force was gathering strength in Europe. The term “industrial revolution” was coined by the French as a metaphor of the affinity between technology and the great political revolution of modern times. Soon exported to the United States, the industrial revolution swept away any visions of America being an agrarian society. The steam engine, the railroad, the mechanical thresher, and hundreds of other ingenious artifacts that increased man’s ability to transform the natural world and put it to use would soon be puffing and clattering and roaring in all corners of the land. The new machines swiftly accelerated the consumption of raw materials from the nation’s farms, forests, and mines.

Lumbering became the nation’s most important industry in the late eighteenth century. Wood was the most widely used raw material for heating, houses, barns, and shops; the same can be said for ships, furniture, railroad ties, factories and paper-making. The supply seemed inexhaustible since the forest still darkened huge parts of the country. The forest melted away before the axes of the advancing Americans. The settlers never thought of their axe work as deforestation, but as the progress of civilization. Soon after the tree cover was removed, the forest soil began to lose nutrients such as organic matter and materials. The soil began washing away, turning clear streams into slow, muddy ditches, filling lakes, and killing fish.

Meanwhile, the big cities and growing wealth of the East were creating a more rapidly expanding market for wheat, corn, beef, and other cash crops. New roads and canals, the steamboat and the locomotive, made domestic and foreign markets increasingly accessible to farms in the center of the continent. Eli Whitney’s cotton gin, Cyrus McCormick’s reaper, Benjamin Holt’s combine and other ingenious inventions encouraged the development of a highly productive and efficient agriculture that sharply reduced the biological diversity of the land. Mining both preceded and quickly followed settlement of the interior, and left deep and permanent scars on the continent’s land and waters. Gold in California, lead in Illinois, coal and oil in Pennsylvania, iron ore in Minnesota, and copper in Montana attracted fortune hunters and job seekers. Reports of a strike would draw thousands of prospectors and workers as well as those who lived off them. Mines were operated without care for the surrounding countryside. The picks and shovels, the hoses

and dredges, and the smaller fires of the miners created the nation's first widespread pollution and environmental health problems. Mining left behind gutted mountains, dredged-out streams, despoiled vegetation, open pits, polluted creeks, barren hillsides and meadows, a littered landscape, and abandoned camps. Mining contributed to deforestation of the countryside. Woodlands were often cleared for mining operations; enormous amounts of timber were needed for the posts and beams that supported the mine shafts and fueled smelter operations (5).

Steam shovels came into use in the 1880s, enabling the coal operators of Pennsylvania and the iron ore producers of Minnesota to peel away the very crust of the earth to extract raw materials for industry and wealth for themselves. Spoils from the coal started to turn streams more acidic. The discovery of oil in Pennsylvania in 1859 brought drilling rigs that poked into the skyline: large areas of soil were soaked with black ooze (5). It was in the cities that environmental pollution and its effects were most pervasive. Garbage and filth of every kind were thrown into the streets, covering the surface, filling the gutters, obscuring the sewer culverts that sent forth perennial emanations. In the winter, the filth and garbage would accumulate in the streets to the depth of sometimes two or three feet. Most cities were nightmares of primitive sanitation and waste disposal systems. Privies for sewage and private wells for water were still widely used in metropolitan areas until the end of the nineteenth century.

Perhaps the national government could have done more to protect the land and its resources as well as public health. But, for most of the nineteenth century, the government was still a weak presence in most areas of the country. There was, moreover, no body of laws with which the government could assert its authority. *Laissez-faire* was the order of the day. By the end of the century there was a growing body of information about the harm being done and some new ideas on how to set things straight. Yet, there was no acceptable ethic that would impel people to treat the land, air, and water with wisdom and care. To a large extent the people did not know what they were doing (5).

As the nineteenth century was drawing to a close, three very special individuals made their entrance on the national stage. Gifford Pinchot, John Muir, and Theodore Roosevelt were to write the first pages of modern environmental history in the United States, which in turn led to the birth of the modern environmental movement early in the twentieth century. However, pollution and environmental degradation was a fact of life across most of America during the first half of the 20th century, phrases such as "the smell of money", "good, clean soot", "God bless it", "it's our life-blood", and "an index to local activity and enterprise" were used to describe air pollution.

The federal government ultimately entered into the environmental and conservation business in a significant fashion when Teddy Roosevelt's second cousin Franklin entered the White House in 1933. It was his political ideology as much as his love of nature that led Roosevelt to include major conservation projects in his New Deal reforms. The Civilian Conservation Corps, the Soil Conservation Service, and the Tennessee Valley Authority were among the many New Deal programs created to serve both the land and the people.

At this point in time, muscle and animal power were replaced by electricity, internal-combustion engines, and nuclear reactors. At the same time, industry was consuming natural resources at an incredible rate. All of these events began to escalate at a dangerous rate after World War II. Soon after, in the late summer of 1962, a marine biologist named Rachel Carson, author of *Silent Spring*, the best-selling book about ocean life, opened the eyes of the world to the dangers of attacking the environment. It was perhaps at this point that America began calling in earnest for reform of the destruction of nature and constraints on environmental degradation. Finally, in the 1970s, Congress began turning out environmental laws that addressed these issues. It all began in 1970 with the birth of the Environmental Protection Agency.

For additional literature regarding Early History and the Environmental Movement, the interested reader is referred to the book by Philip Shabecoff, titled *A Fierce Green Fire* (5). This outstanding book, as well as Ponting's *A Green History of the World* (3), is a "must" for anyone who works in, or has interests with the environment.

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